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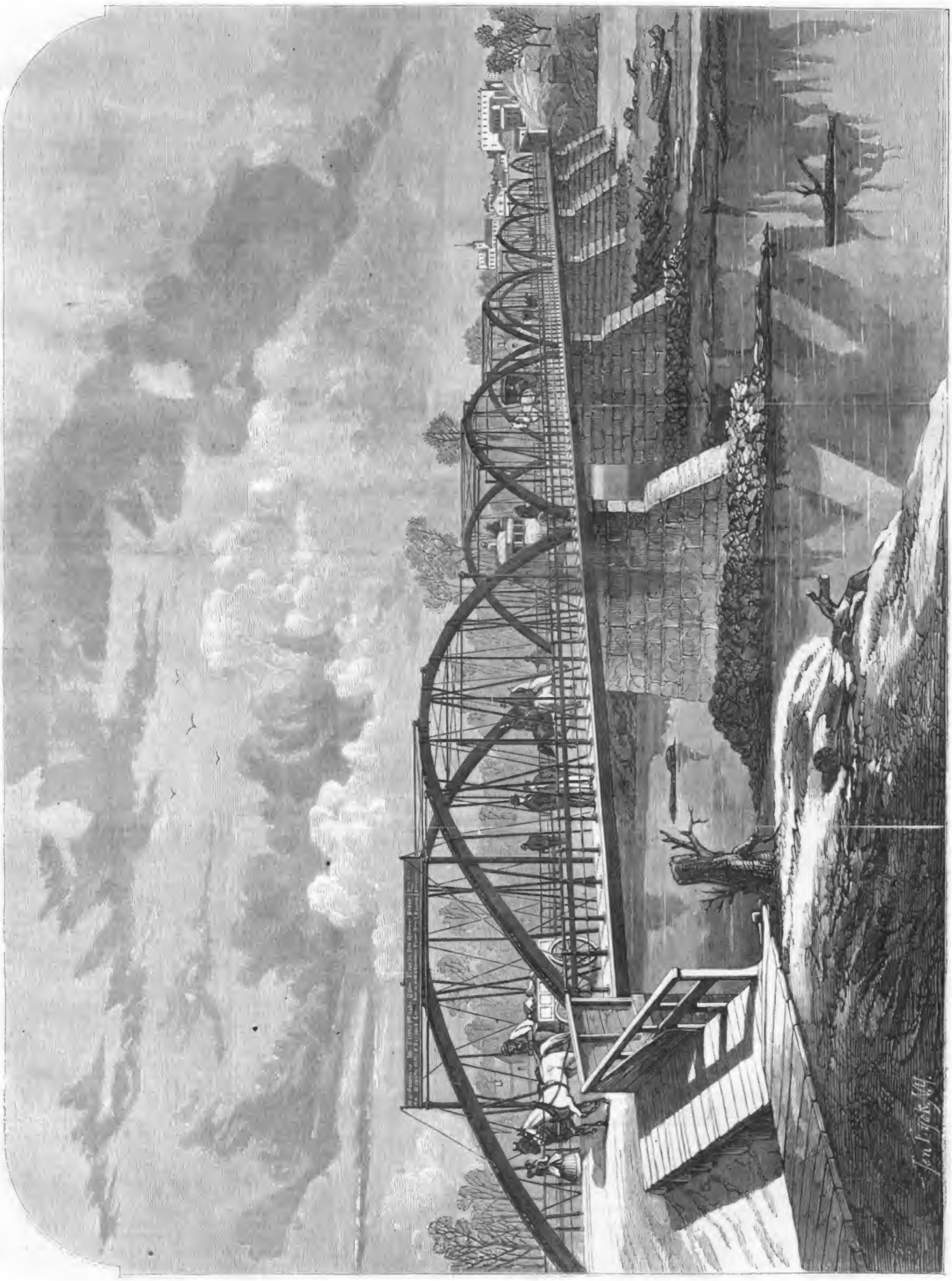


KING'S PATENT WROUGHT-IRON SOLID AND TUBULAR CHANNEL ARCH BRIDGES.—*For description see next page.*

IRON BRIDGE AT TOPEKA, KANSAS.

The immense and increasing use of iron in various forms in all departments of construction, is so marked a feature of the present age, that no surprise is excited when a new application, or an improvement in any old application of this material, is announced. In the department of architecture and civil engineering the advances in the employment of iron during the last quarter of a century have been immense and rapid. In naval construction, too, its effects have been such as to almost revolutionize ocean commerce, and to transfer the large shipbuilding trade, which formerly existed in this country, almost wholly to foreign lands.

In almost every department of the arts, iron and steel are gradually superseding wood for constructive purposes and almost daily one hears of some new application of this wonderful material.

But in no department of mechanical construction, has there been such a universal tendency to extend the employment of iron as in bridge construction. The nature of the material peculiarly fits it for use in structures of this kind, and multitudes of iron bridges now span the rivers of Europe and America. The forms of these bridges are also extremely diverse, and engineers have vied with each other to devise a construction wherein maximum strength with minimum weight, should unite with least cost. Patents have multiplied, and experiment has followed experiment, only to demonstrate more fully the great value of this application of a material that is inexhaustible in quantity, and unrivaled in strength, except by steel, itself a derivative of iron.

As weight depends upon quantity, the great problem in bridge construction is to so dispose the material, that the cohesive force of every particle shall act to the greatest advantage. In order to do this it is imperative that a weight placed upon any one part shall not concentrate its force upon that part alone, but that the strain it creates shall be distributed to other parts, and, so far as possible, to all parts of a span; so that mutual support is obtained in the highest degree.

To this end innumerable forms of trusses, trestlework, etc., have been devised, and the science of mathematics has been invoked to aid experiment in determining the laws by which strains are distributed through compound structures, and the strength of individual parts to resist deflection.

It is not strange that in so complex a general problem as this, and one which has given rise to such a vast number of special problems, some differences of opinion should arise, and that still there should be some points upon which doubt exists. The fundamental principles, however, are fully demonstrated, if perhaps we except the law of deflection of beams which has lately been questioned by Professor Norton, of New Haven. [See page 256, last Vol., SCIENTIFIC AMERICAN].

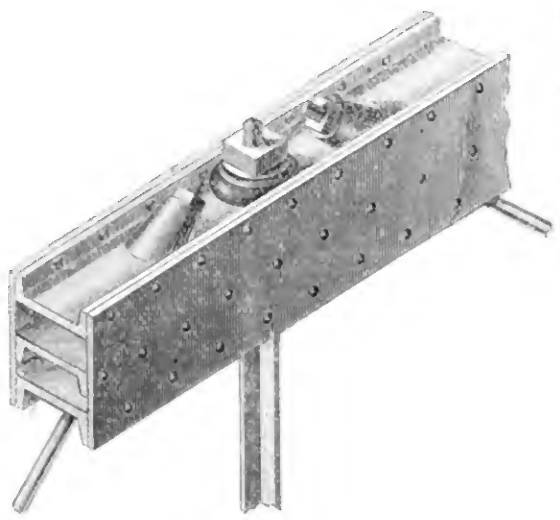
The inventor of the bridge we are about to describe, and —if we may judge from the testimony of numerous engineers and civilians—many others believe that superior results in the attainment of strength combined with lightness and cheapness, have been secured by the principle of construction adopted therein, and the great number of these bridges which are in use (we are told 700 have been built since 1860) shows that they are of a character to secure the confidence of the engineering public.

Our engraving is that of a bridge of this kind built over the Kansas River, at Topeka, Kansas. It is composed of six spans of one hundred and fifty feet in length, making a total length of nine hundred feet. It is eighteen feet wide in the clear with a sidewalk on each side. The hight of the arches is sixteen feet measured to the crown. Each arch has two chords with a section of six inches by three fourths of an inch. The arches are of boiler plate and channel iron. A section of this arch is shown at A, Fig. 2, which explains the manner of its construction sufficiently without minute description.

The arch is nine inches by thirteen at the foot, and nine by ten inches at the center. By reference to Fig. 2 the style of bracing will be also more apparent than the scale of the larger engraving renders possible. The spaces between the chords and arches are filled with struts and braces so disposed as to distribute the strain uniformly to all parts of the structure.

The Western bridges in this country designed for general traffic are often subjected to severe strain from droves of cattle, which, in passing, produce a cumulative oscillation peculiarly trying to them. In fact it is probable that one hundred cattle driven upon a bridge of such spans as the one shown in our engraving, and moving together, would test its strength more severely than a train of passenger cars at moderate speed. It is on this account that the ability to pass cattle without extraordinary deflection has come to be a sort of standard for the strength of bridges. A large number of these bridges have been thus tested and found to resist the strain in the most satisfactory manner.

A bridge of this kind over Blue River, at Edinburgh, Indiana, composed of two spans, each one hundred and sixty feet in length, was tested by driving upon it one hundred and twenty head of cattle, first on to one span and then on to the other, without any visible deflection. The cattle were then crowded hurriedly into the center of a single span, and yet no visible deflection occurred.



H. Theilson, chief engineer of the Burlington and Missouri Railroad, states that he has examined the iron bridge built over Spring Creek, near Chandler's, Des Moines county, Iowa, being one of King's patent channel bridges, sixty feet span, and found it to be a substantial and strong structure, well adapted for the purpose designed.

These are but samples of a large number of similar testimonials which have been shown us, and those familiar with the subject will at once comprehend that bridges which can withstand these tests must be of great strength.

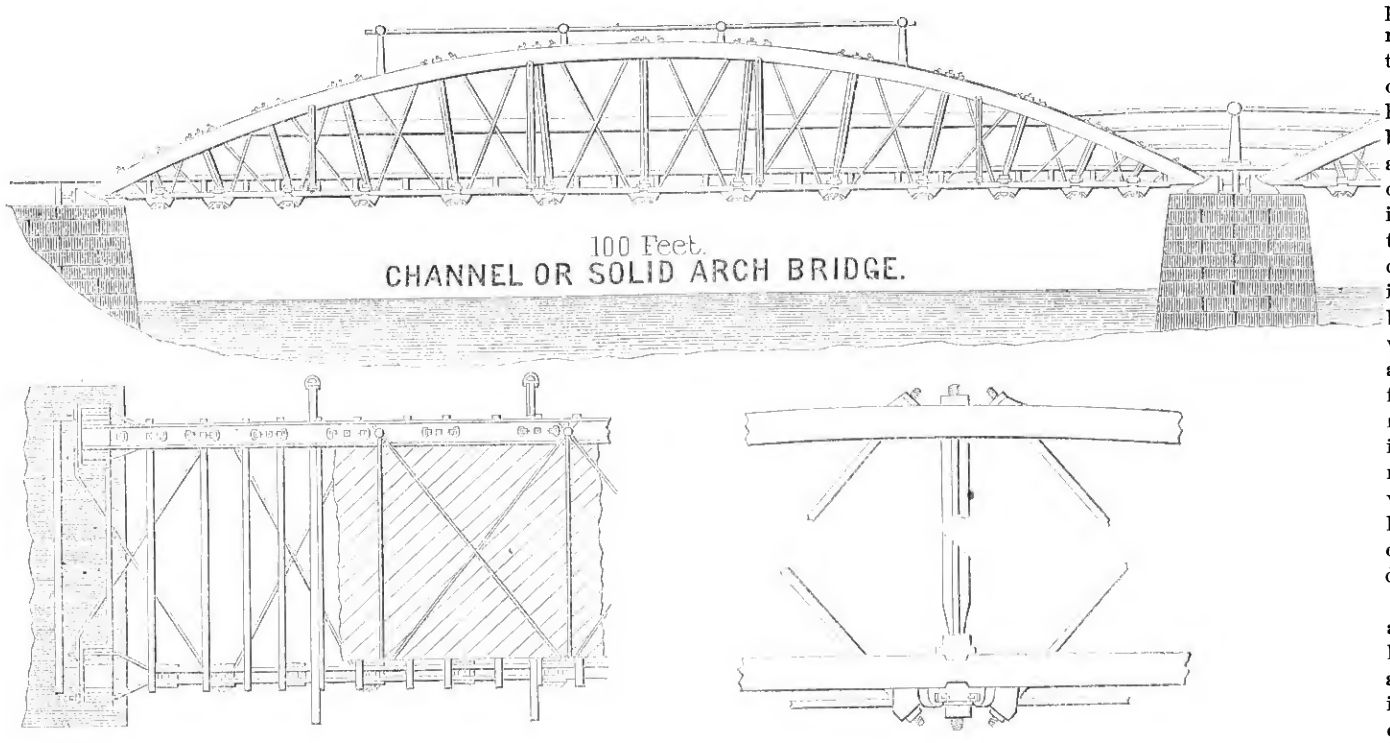
We give in Fig. 3 an elevation, partial plan, and enlarged detail of a channel or solid arch bridge, of one hundred feet span, showing the manner of bracing between the chord and the arch, and also the horizontal cross bracing.

The manufacturers of these bridges have secured such an extended demand for them that they find it necessary to keep on hand a large stock of bridges of all lengths, to fill their orders. This is a new and peculiar feature in bridge building, and sufficiently indicates the esteem in which their work is held by the public. Wrought iron is the only material employed in their construction unless we except the floor planking.

The manufacturers also make a wrought-iron swing or drawbridge, which they claim is one of the stiffest and strongest now constructed. The tubes of these swing bridges are also made of channel iron and sheets riveted together. The floor beams pass through and are firmly riveted to each side of the tubes, connecting the tubes together; and the whole is thoroughly braced underneath the floor.

They also construct the Ives' patent cast-iron columns or supports for bridges designed to be used instead of stone piers. It is claimed that they only cost half as much as stone in prairie country, where stone is scarce, and that they answer the purpose admirably.

This bridge and its adjuncts are covered by a number of patents dating from 1861 to 1870. For further information address Z. King & Son, Cleveland, Ohio. Office and works corner of St. Clair and Wason streets.



POSITIVE and negative electricity is always developed in equal proportions from a battery.

How People Live in Paris.

An article in the *Penn Monthly*, entitled "Paris with American eyes," contains the following: "The necessity of artificial wants, of luxuries, of pleasurable idleness to prevent over-production, is fully recognized in France. All the officers of government—executive, legislative, judicial, administrative; the Emperor and his family, ministers, senators, judges, officers of the law; all the soldiery, from generals to privates; all the learned men, from professors to students, doctors to victims, clergymen and penitents; and the host of others—actors, editors, writers, thieves, traders; many, if not most, of those who are engaged in handicraft of all kinds; all women, sick persons, and young children—must look for their support to artificial, not natural, productiveness. The proposition reduces itself to this: Given a nation with land enough to raise food, fuel, textile material, mineral products, and building material for a certain number of inhabitants; then it is a mal-administration of government when it is not provided to apportion the natural productions among them. And this should be done, without borrowing money or products from other nations, to be repaid for by future generations; famine or war alone justifying a departure from this rule. The application of this proposition to American affairs, at this moment, might be made, as well as to the condition of labor in France. It, perhaps, may seem an imprudent statement, but we think that about one person only in sixty is really occupied in producing the living necessities of civilized human existence. Be the theory propounded as it may, this one thing is certain: that, for fifteen years, the poor laboring man has not, while the granaries of France were full, suffered for want of bread in Paris, because his labor could not be exexchanged therefor. In London, overflowing with wealth, many hundreds starved to death the past winter; and in the United States, with the absorption of our lands, the evil day is upon us. Even now, in New York, or any of our large cities, there is far more destitution than in Paris."

White Slaves.

There seems to be an impression among a great many people that somebody is doing them a grievous wrong, unless they are able to make a liberal livelihood, and only work one third of the time. There was an old edict once passed by an authority that is much contemned now, which declared to mankind that "by the sweat of thy brow shalt thou eat bread," but our age has outgrown such restrictions, and all classes of people have concluded to earn their bread on easier terms, or at least abuse somebody roundly, whether such person be the right one or not, provided they find the bread is not abundant or is hard to come at.

We are always glad to find toil well recompensed, and wish to encourage every increase of the wages of labor, and would be pleased if eight hours' work could be made to produce as much pay as ten. But we utterly despise the man who wants to get off with eight hours' work when he can do ten, and who laments if he cannot indulge his penchant for laziness. No man would think of working only eight or ten hours if he were laboring for himself, and the great error of our entire system is that it is the custom to pay mechanical labor by the day instead of paying it by the hour. The world is entitled to all and the best efforts of which every man is capable, and is cheated if it does not receive them: whereas he can justly claim the reward of everything that he does.

To restrict labor of any kind to a fixed limit is an outrage and oppression where it is not a folly or a crime. One man is capable of working twelve hours at severe manual toil. Why should he not be permitted to do so and to draw a proportionately larger return than the feeble individual who is exhausted in half the time? Were a lawyer, an editor, a doctor, or a farmer to make a rule that he would not begin work till ten o'clock and would leave off at six, no matter whether the columns were empty, or the patients were dying, or the clients were in prison, or the crops were rotting, how long would it be before such a lunatic were in the poor-house? And yet, were a builder, sore-pressed to complete his contracts, to ask mechanics to commence work at five o'clock and not leave off till seven, provided he paid them extra, he would probably be refused. We have no patience with laziness, and yet our nation seems to be deifying laziness into a god.—*N. Y. Citizen.*

ROMER, a Danish astronomer, who flourished in 1676 was the first person who discovered the velocity of light, which he calculated to be at the rate of 167,600 geographical miles a second.

STRANGE DRINKS.

[From Chambers' Journal.]

"Man, being reasonable, must get drunk!" Many people accept that as an axiom who never heard the name of the poet who wrote it. On that head the most forlorn and stupid of savages are at one with civilized folks; and some extremely curious, let alone nasty concoctions, does human ingenuity hit upon in its desperate desire to produce a beverage that will cheer and inebriate. The cocoa-nut tree is a great boon to thirsty man, giving the weary traveler a draft of pure water, rewarding the early riser with a cup of sparkling toddy, and delighting lovers of strong potations with its potent arrack. The first beverage is contained in the fruit; the less innocent ones are made from the sap of the tree. The operations of the Cingalese toddy-drawer are simple enough. He binds all the shoots bearing embryo nuts firmly together, cuts off the ends, and attaches beneath them an earthenware vessel holding about a gallon, and so leaves matters for four-and-twenty hours—from sunrise to sunrise. When the time is up, the chatty is lowered, emptied of its contents, and replaced; and so the process goes on, until the flow of sap is exhausted. The liquor thus obtained looks like milk and water, and tastes like soda-water and milk slightly flavored with cocoa-nut. In a few hours, rapid acetous fermentation takes place, and by mid-day the sap becomes toddy, resembling a poor acid cider, and from this arrack is made by distillation. The same source supplies the subjects of the Rajah of Sarawak with their national beverage, which is kept in huge jars, and hospitably handed to all comers in cans, bottles, or cocoa-nut shells, whichever happen to be handiest. Mr. Boyle says it looks like thin milk, and smells like five hundred negroes drunk in a slave pen, while its flavor seems to be as unique as its smell.

"When first taken into the mouth, it suggests an idea of cocoa-nut milk gone very sour, and holding in solution a very considerable quantity of brown sugar and old cheese; when it reaches the throat, the agonized novice becomes aware of a hot peppery flavor, causing him to believe that starch mingled with the finest cayenne must have a great share in the composition; and, finally, should it safely reach its destination, and the sufferer be compelled to put his head precipitately through the railings behind, he conceives with astonishing suddenness that he is waiting for the crisis in a rolling vessel at the change of the monsoons."

When the Marquesans are in the humor for a drinking bout, a number of boys are set to work preparing aroo, by squatting around a large bowl, and masticating cocoa-nuts, which they spit into the bowl when sufficiently chewed. Enough being prepared, the vessel is filled up with fresh water, and stirred, and the pleasant mess left to settle, when the flowing bowl is passed about for the merrymakers to drain to the lees.

Another drink, in high esteem among the South Sea Islanders, is made in a similar manner from the ava root, and ava drinking forms an essential feature of all Feejeean ceremonies. In Rewa, when the ava has been duly chewed, as the water is poured in, the expectant spectators, ranged in a semicircle round the chief operator, set up a howl, finishing off with a cry of "*Ai seou.*" Then the operator strains the liquid into an immense wooden bowl, singing all the while; his song being taken up by the company, who, at the same time, imitate his motions to the best of their ability, varying the performances at every important stage of the proceedings by clapping their hands. The brewage concluded, the drinking cups are filled from one having a hole in it; over the hole the ava maker placing a finger when dipping, withdrawing it to let the liquor ran out on a stream. The drinking of the king's draft is followed by an extra loud clapping; that of an inferior chief by the exclamation: "*Sa madaa!*" (It is empty): After ava, his Rewain majesty rinses his mouth, lights his cigar, and takes his ease on his mat. The royal barber, not being permitted to touch anything with his hands, has to find a friend to hold the cup to his lips while he drinks his allowance. The royal ava drinking at Somu-somu is equally ceremonious. Early in the morning the king's herald or orator cries out in front of his house: "*Yango-na li ava.*" To this the people reply with loud shouts, meaning "prepare ava." The chiefs and principal men assemble immediately with their bowls and ava roots, which are handed over to the younger folks, while they have a palaver about things in general. The ava preparers must have clean and undiseased teeth, and are liable to punishment if they are detected swallowing any of the precious juice. The chewing over, and the water poured on the ava, the herald drawls out in the vernacular: "Make the offering." The ava is then strained through cocoa-nut husks—a tedious operation. Then the herald repeats his cry, and the chiefs join in the chorus. Somebody is dispatched with the royal ava, and the company go on singing. The orator invokes their god, Tava Sava, and his companions implore their dead friends by name to watch over them. Then prayers are raised for the king's life, for rain, the arrival of ships, for riches, and life to enjoy them. The chorus, "*Mana endina sendina le,*" a sort of "Amen, so be it," is repeated again and again, each time in a higher pitch, until the force of human lungs can no higher go, when the performance ends in a general screech of "*O-ya-ye!*" which is taken up by the outer mob; and then the king drinks his ava, the chiefs clapping hands while he does so, and when he has finished, setting to work upon their own account, and afterwards to business with what soberness they may. No one dreams of doing anything until the king has emptied his bowl; and if a visitor wishes to keep on good terms with his hosts, he must be careful not to do any work, or make any noise, until the ceremony has come to an end. The pievorree of Guiana and the chica of Chili and Brazil, like ava and aroo, are produced by the masticatory process; the first named being a concoction of cassava bread, saliva, and water; while the principal ingredient of the Brazilian chica consists of maize dough, thoroughly chewed by a parcel of old women.

Among the many strange acquaintances made by M. du Chaillu was a drunken old chief named Olenga-Yombi, whose head wife favored the gorilla hunter with the following account of her worthy husband's bringing up: "When he was quite a child, Olenga Yombi's father used to put him in a big bag, and carry him to the top of a high tree, where he plied him with the intoxicating palm wine. Every day he repeated the dose, till the child came to like palm wine better than his mother's milk, whereat the father was greatly delighted, because he wished him to be renowned when he was grown up for the quantity of palm wine he could drink. 'So you see, Chaillu, you must not be angry with him, for it is not his own fault.'" This frightful example was always going to the drink, on the drink, or sleeping off the drink, and must have furnished a nice text for the total abstainers of those parts, supposing they preferred their principles to their heads.

Genuine palm wine is obtained from the palmyra palm, and is far superior to that of the cocoa-nut tree. As the trunk of the tree is too rough for hands and knees to be used in climbing, the wine drawer adopts another mode of ascent. He passes round his body and the stem of the tree a hoop of bamboo, which serves to support his back. Pressing his feet firmly against the trunk, and grasping the hoop as firmly with his hands, he draws slightly forward, keeping his foot steady, and slipping the hoop up a little higher, advances a step or two with his feet; and so he goes up some fifty or sixty feet, till he reaches the leafy crown of the palm. He then bores a hole in the trunk, about half an inch deep, and inserts a leaf rolled up funnel-wise into it, the other end being inserted into the mouth of a calabash, which he sends down as soon as it is full. A tree will yield a quart of wine twice a day for a month; and if the hole is afterwards carefully stopped with clay, wine may be drawn from the same tree for many successive years. Captain Burton says the oil palm yields the finest wine of all, a drink surpassing the best of cider. His Majesty of Dahomey, however, with an eye to the oil trade, prohibits his subjects from drawing their liquor from this source, because, like the Kroomen, they fell the trees first; so that the thirsty souls of Whydah have to content themselves with bamboo wine, tasting like soapsuds laced with vinegar.

Dr. Livingstone found the Magenja of the Zambesi the possessors of a grateful beverage, which satisfied the cravings of fever at one draft, and almost justified the advice of a friendly chief: "Drink plenty of it, and as it gets in it will drive the fever out." This beer is made from vegetated grain dried in the sun, pounded into meal, and gently boiled. When a day or two old it is fit to drink, and is then a pinkish, sweet, acidified liquor of the consistence of gruel. It only intoxicates when deep and long-continued potations are indulged in, and then even no permanently evil result follows, for the Magenta are, for Africans, a very long-lived race, although, in contempt of European sanitary notions, they never wash themselves unless by accident. Drinking is the one enjoyment of their existence, and the completion of a family brewing an occasion of merry-making. Sometimes a selfish couple will pretend to be ill, and shut themselves up in their hut until they have put away all their brewage; but they generally invite their friends, who in return praise the beer as so good that the taste reaches to the back of the neck, or declare that it will make their stomachs cry "Tobu, tobu, tobu!" at every step on the road home.

Abyssinian beer, known as sona, tallah, or donqua, according to its quality and strength, is made by mixing Dagbusha flour into a dough, and leaving it two or three weeks to ferment, when the dough is made up into cakes and baked on hot iron. These are put into a large jar of water, with a mixture of barley meal and water, and a small quantity of a bitter herb called "geso," growing abundantly upon the plains. After remaining quiet for a few hours, the beer is considered fit for consumption. Moack, made from this beer by boiling it with eggs, honey, butter, and spice, is declared by a traveler to be a drink fit for the entertainment of the gods, when in the good old Abyssinian times they used to pay that land an annual visit. But the favorite beverage among our whilom foes is tedge or honey wine, which was praised years ago by the Jesuit father, Foncet, as a delicious liquor, pure, clarified, and the color of Spanish white wine. The process of manufacture is a simple one. To one part of wild honey is added five or six parts of cold water; this is well stirred and put into a narrow-mouthed jar, with a little sprouted barley, some biccalo or taddoo bark, and a few geso leaves. After three or four days, exposure in the sun, this ferments, and is generally drunk as soon as it has nearly lost its original sweetness, being even then a muddy sort of liquor. Mr. Parkyns speaks disparagingly of it, and quotes Bruce against it; but the natives appreciate it highly, and drink inordinately of it when they have the chance. In Shoa, the manufacture of tedge used to be a royal monopoly, and it was not allowed to be sold in public. Of course it was to be procured by bribery, but even then, Mr. Johnson says, the purchaser probably got the rations of some economically disposed guest of the king, who had poured his daily allowance into a large jar instead of drinking it. A superior sort, made for his Shoan Majesty's own use, was prepared by adding kuloh berries (resembling our elder berries) to the other ingredients, and allowing the liquor to be undrawn for some months. This was called "barilla," from its being handed to guests in small Venetian bottles of green glass, the accidental breakage of which was a serious offense in the monarch's eyes. Mr. Henty, the war correspondent of the *Standard* newspaper, describes the taste of tedge as resembling a mixture of small-beer and lemonade made from moldy lemons. With three comrades, he went into a native public house at Abtegrat fair, and called for tedge. It was brought in a flask resembling a Lucca oil-flask, but rather flatter, and with a larger neck. As it did not hold more than half a pint, the hot and thirsty customers soon called for more, but were made to understand they must wait for it to be strained, an operation they witnessed with dismay. A large jar was brought in; the wife of the proprietor put a part of her very dirty garment over the mouth, and poured the liquor through it into the flask. Luckily, Mr. Henty and his friends had learned not to be over-squeamish, and were able, spite of some qualms, to satisfy their thirst; he does not say whether the straining process improved the flavor of his honey wine, or otherwise.

Besdon, a drink in high esteem in some parts of Africa, is made like tedge with honey, but in this case the only addition is some millet, the beverage being brought to perfection by being exposed for ten days to the action of the sun. The Soosoos extract a tolerably palatable liquor from "yin-ying" root, by burning it and infusing the ashes in water. The people of Unyon think it wasteful to eat the plantain. They bury the green fruit in a deep hole, and keep it covered with earth and straw until it ripens. It is then peeled and pulped into a large wooden trough well mashed, and thoroughly stirred; in a couple of days it is fit for use. The Bulloms go a different way to work; they let the fruit ripen naturally, remove the skin, and bruise the rest in hot water. In twelve hours or so, this mixture is strained and bottled, being corked closely for a week, by which time it has become a beverage of moderate intoxicating power. The folks of Taboga find their wine all but ready-made. When the flower stalks of the American agave begin to sprout, the heart of the plant is cut out, and the juice collects in an artificial well formed by the operation. One plant will yield as much as three pints a day for a month; and when the juice has fermented, it will cause intoxication, and the end of the collector is attained.

Dampier relates how his friend Laut, Rajah of Mindinao, with all his courtiers, got as drunk as swine upon rice drink, which must have been a similar beverage to saki, beloved of the Japanese, who make it of all degrees of strength, from that of weak wine to potent spirit; and much the same sort of thing as the Chinese samshu, and, in the opinion of Sir R. Alcock, quite as good or bad. Marco Polo perhaps because he had not tasted it, is much more complimentary. He says: "The greater part of the people of Cathay drink a wine made of rice and many good spices, and prepare it in such a way that it is more agreeable to drink than any other liquor. It is clear and beautiful, and makes a man drunk sooner than any other wine." This is praise indeed. But of all curious drinks, commend us to Ladakh beer, which possesses the great merit of portability. It is made of parched barley, ground, mixed with rice and the root of an aromatic plant, pressed into a hard solid cake. When wanted, a piece is broken off, and thrown into a vessel of water to ferment. This resembles gruel in appearance, and has a sour spirituous smell. What a boon it would be to our soldiers and sailors if the beverages of Bass and Whitbread could be thus solidified? Where is the inventive genius, not above taking a hint from the savage, who will make it possible to carry a pint or two of Burton ale or London porter in one's waistcoat pocket?

The SCIENTIFIC AMERICAN, with the first of July, begins the second volume of the year. It is superfluous to describe and almost superfluous to praise this, which is undoubtedly the most successful technical journal of America. On the whole it has well deserved its success—not but that there might be a better technical journal, simply as a technical journal; but that it has given scientific and technical information carefully, skillfully, and correctly to the largest possible audience. It is one of the many good points of the SCIENTIFIC AMERICAN that it is not above being understood. There is scarcely any subject connected with the mechanic arts which it does not treat intelligently, and it has become indispensable to every one—mechanic, farmer, business or professional man—who would keep himself informed of the progress of the nation in the mechanic arts and sciences. During the year it has widened its field and increased its interest by greater attention paid to the natural sciences, treated in a popular manner. We hope that it may go further in this direction, and that, when it has occupied the whole field, and does in reality represent thoroughly the "scientific" American, no intelligent American family will be without it. Of course there are always many—especially women and children—who care little for mechanics. But there are—or should be—very few who are not, or cannot be made to be, interested in some branch of natural science, so when this field is adequately occupied, we may expect to find the SCIENTIFIC AMERICAN to find a place in "my lady's chamber" by the side of the *Bazar*, *Every Saturday*, and the magazines. But it is hardly fair to ask this journal to be "all things to all men"—and, moreover, when it is already so much to so large a class.—*Railroad Gazette.*

Arkansas State Fair.

The Third Annual Fair of the Arkansas State Agricultural Association will be held at the grounds of the Association at Little Rock, commencing Tuesday, October 11, 1870, and continuing four days. Schedules of premiums and regulations may be obtained by addressing the Secretary, Mr. Edward C. Morton, Little Rock, Arkansas.

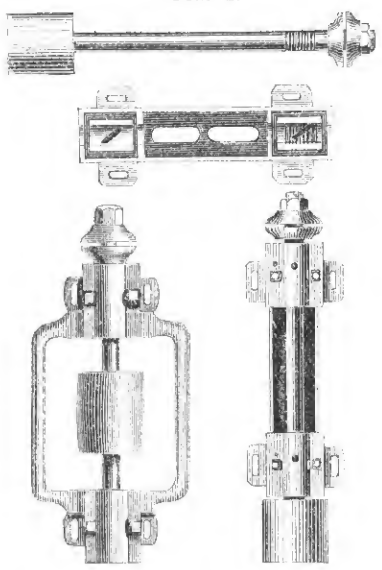
TO CANADIAN INVENTORS.—Under the Amended Patent Law, Canadian inventors are allowed to apply for patents on the same terms as foreigners of other countries. In fact there is now no discrimination in this respect, all inventors—citizen and alien—being placed upon the same footing. This is an example worthy to be followed by the Government of the Dominion.

S. A. WOODS' SELF-OILING CIRCULAR-SAW ARBORS AND ADJUSTABLE CONE BUSHING.

Our engravings illustrate improvements in saw arbors, which seem to possess many advantages over other arbors now in use. They are provided with self-oiling boxes shown in Fig. 1, and with an adjustable cone bushing, shown in Fig. 2.

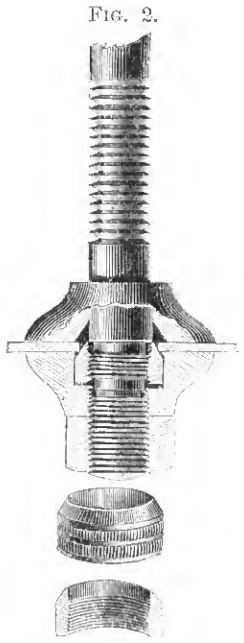
The self-oiling box possesses superior advantages. It consists of a chamber under the journal for the oil, which is fed to the bearing in sufficient quantity to always keep it lubricated; the oil being carried up by capillary attraction through a small cotton-waste packing placed in the cavity diagonally across the box, the end extending down into the air chamber below, as shown in the section of the box in Fig. 1.

FIG. 1.



The bed and boxes are cast together, and are consequently always in line. On one of the journals are a number of V-shaped grooves, with corresponding grooves in the Babbitt lining of the box, which prevent all end motion, and keep the arbor always in its proper place.

FIG. 2.



The adjustable cone bushing, shown in Fig. 2, will commend itself, we think, to all practical mechanics as a perfect means of centering the saw on the arbor. With this bushing saws can be used with holes varying three eighths of an inch in the same arbor, without the inconvenience of bushing each saw, as will be seen by reference to the engraving; and the arbor can be used either with or without the bushings. If saws come with holes to fit the arbors, the bushings can be left off.

Those who have used these arbors, and with whom we have conversed, are unanimous in conceding their superiority.

Patented, September 7, 1868. For further particulars or for price lists, address S. A. Woods, 91 Liberty street, New York city, or 67 Sudbury street, Boston, Mass.

Department of Docks of the City of New York.

The Commissioners of Docks held a public meeting, July 8th, for the further consideration of plans, specifications, and suggestions in relation to the docks and piers of the city. John T. Agnew presided, and the following members were present: Messrs. Wood, Henry, Hunt, and Smith.

Mr. S. F. Chellbourne presented the following in relation to sewerage: He would construct two main sewers inside of the new bulkhead on each side of the city from the Battery to Westchester. At these points there should be a tidal basin of twenty to fifty acres to receive the flood tide, and discharge it on the ebb through these main sewers. These main sewers would receive the contents of all cross-town sewers, and joining at the Battery would be continued in one large subaqueous sewer to a point in the bay near Ellis Island, where should be constructed a reservoir. A dredger is to be provided in the reservoir capable of supplying 800,000 tuns per annum of the solid matter of the sewerage to scow tanks, and then sold to farmers and gardners. These main sewers will clean themselves, being flushed by tide water.

Mr. C. H. Lillenthel proposed to build a system of piers extending around the city, on which buildings are to be placed for the storage of combustible materials, for keeping or slaughtering purposes, or for others that are objectionable to have in the city.

A railroad track on the wharf extending to each pier, the advantages being that it would require but little power, being on a dead level, the cars could be twice the size of ordinary cars, and be driven by a small engine. The rental of the buildings would pay a large dividend on the outlay.

Mr. J. C. Luce submitted the following: Piers of granite in solid masonry parallel with the river line, twelve feet long and 100 feet wide, should be built, and intersected at right angles midway by one of the same width running from the bulkhead, through which should run a sewer to the river. Large and small iron posts should be set in the piers for use in making ships fast and unloading them. On the pier fireproof warehouses should be built for storage and other purposes. Bulkheads should be extended thirty to fifty feet in solid masonry, covered with a continuous iron shed from the Battery to Harlem River. On the roof of these structures rail tracks may be laid for conveying passengers or freight from the Harlem River to the Battery.

Theron Skeel presented a plan for driving iron screw piles, which are to be chemically protected by gutta-percha from corrosion, and then mechanically protected by a covering of wood. Mr. James Burson exhibited a model of a construction for laying masonry under water.

Mr. Charles Pontez submitted a plan, with drawings, for the foundation of structures with great solidity, in deep water, without the use of the coffer-dam. His plan was to use an immersed coffer or caisson, as now used in the foundation of the abutments of the Brooklyn bridge. He then gave a detailed description of the construction.

The meeting then adjourned.

This was the last public meeting, although the stated meetings will be as usual, when plans, specifications, etc., may be sent in. Already there have been forty-five plans, specifications, drawings, etc., presented, which the Commissioners will carefully examine.

Gen. McClellan has been appointed Engineer-in-chief of the Department of Docks.

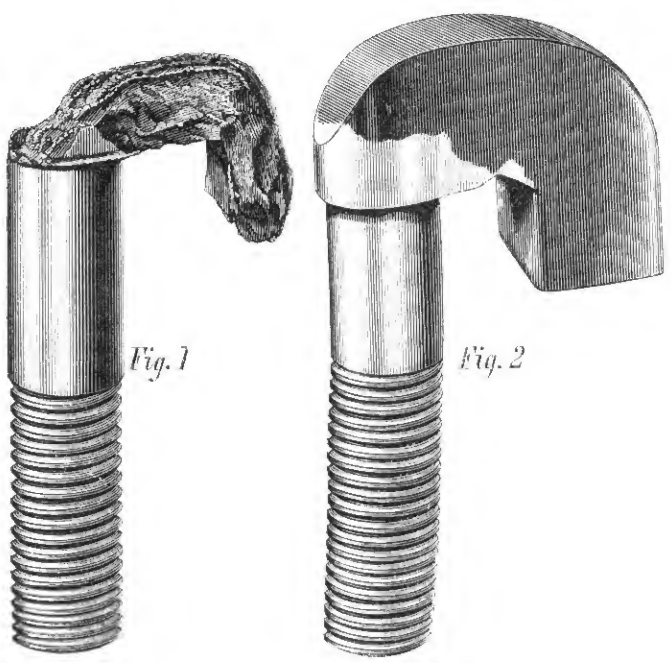
The Originator of the Telegraph System.

The name of Mr. Francis Ronalds was lately recorded as having received the honor of knighthood. Who is Mr. Francis Ronalds? was a question more likely to be asked than answered. Mr. Ronalds is neither more nor less than the originator of our telegraph system. He was the very first, either here or abroad, to invent an electric telegraph so constructed as to be capable of extensive practical application, and so far back as 1823 he fully developed its principle and mode of action. Still earlier, viz., in 1816, he had constructed a working electric telegraph, and on offering it to the then Government, received an answer which can never be too often cited as an illustration of official complacency: "Telegraphs of any kind are now wholly unnecessary, and no other than the one now in use will be adopted." Nothing daunted by this apathy Mr. Ronalds matured his invention, and in 1823 published a "Description of an Electric Telegraph, and of some other Electrical Apparatus." Mr. Ronalds was too far ahead of his time, and too purely a man of science, to secure a hearing for his discovery in those early days, and it was left to others to mature his idea, and to establish the system which his prophetic eye had foreseen would one day transform the world. It was not till 1837, fourteen years after Mr. Ronalds' pamphlet, that Messrs. Cooke & Wheatstone took out their first patent. The science and practical skill of these and other eminent electricians have brought electric communication to its present state; but the great fact remains that Mr. Ronalds was the first to demonstrate practically the principle which they have developed. At last, thanks to Mr. Gladstone's sympathy with genius, the special merits of Mr. Ronalds as a pioneer in this great field of action have received a public recognition. Mr. Ronalds, although still an active devotee of science, is now in very advanced age. A little longer and his honors might have come too late.—*Pall Mall Gazette.*

NICKEL-PLATING---INTERESTING TO MARINE ENGINEERS.

Our readers are aware that the process of nickel plating is daily extending. Among some of the new applications is that of covering the exposed parts of steam engines with nickel, whereby a surface easily kept bright is obtained, and a highly ornamental appearance is secured.

Mr. L. A. Scofield, chief engineer of the *Lodona*, a steamer of C. H. Mallory's line, plying between this port and New Orleans, called upon us recently, bringing with him specimens of bolts used to secure the valve seat in the air pump of the engine of that vessel, which we have had engraved.



Mr. Scofield stated that the action of the steam and injection water—aided by galvanic action—upon those bolts was formerly such as to corrode them greatly; reducing them in an average of three round trips to the condition shown in Fig. 1.

To obtain a more durable kind of bolts, Mr. Scofield made them of composition, but this metal did not prove sufficiently strong. His next resort was to nickel-plating, and the result is shown in Fig. 2 Both the bolts shown have been equally exposed for three months, and occupied positions only about eight inches apart.

The bolt in Fig. 2 is discolored somewhat, as shown, but this discoloration is extremely thin, not in any place penetrating through the nickel coating. There is no doubt that the application of nickel to this purpose will be found a perfect protection.

MECHANICAL FINGERS.

We give an engraving of what we consider a useful and ingenious contrivance by which a lady who has had the misfortune to lose a hand may perform sewing. The inventor of this contrivance writes to the *English Mechanic*, from which we copy the engraving, as follows:

"Three weeks ago, I had a machinist apply for an arm amputated a few inches from the shoulder, and she wanted among a number of appliances, an instrument that would hold the work like the natural fingers, to enable her to hem, stitch, and tack her work for the machine. After many trials I succeeded, and so successful is the appliance, and so simple, that in a short time she was enabled to stitch and hold the finest or coarsest fabric, with almost as much ease as with the natural fingers.

"The instrument is fixed in the wrist, and is removed, as you see, instantly on touching the spring. There are three rods corresponding to the thumb and the first and second fingers; the two under rods are fixed; the top one, over which the work is drawn, is movable in any direction, and bound to the other two by a vulcanized rubber band; this band according to its tension keeps the work. On each rod is a piece of brass tube, which revolves when the work is drawn. Over the two under tubes is slid a piece of vulcanized rubber pipe. The work is placed in the instrument precisely as it is in over the index finger, the vulcanized rubber holds the work just like the soft cushions of the fingers; as the person stitches she can draw the work, the rollers revolve, and thus they can hem, and stitch at any length. Ladies who have lost an arm at the shoulder, above or below elbow, may now by the use of this instrument follow their favorite employment, which through their loss they may have long been deprived of."

J. GILLINGHAM.

Water-Proof Packing Paper.

Water-proof packing paper is thus made by some manufacturers: The paper is covered with a resinous liquid, then painted over with a solution of glue and soot, as without this the paper will later show blotches. After this is dried, the actual water-proof coat is applied. This is prepared with two and a half ounces of powdered shellac, dissolved into two pints of water, which is gradually brought to boil, and stirred until the substance is perfectly dissolved and softened, when gradually one third ounce of powdered borax is added, until an intimate union of the substances takes place. The liquid is then left to cool, and while still hot any mineral color may be added, such as lampblack, yellow ocher, red ocher, iron blue, or burnt umber, whereupon it is left to get entirely cold. It is then ready for use. It is said the operation can be so quickly performed with a brush that two women can prepare three thousand feet in ten hours.

THOUGH apparently in a state of rest, the atoms or molecules of all gases are always vibrating. Like the motion of gnats in a sunbeam, the molecules of oxygen gas are moving at the rate of 1,500 feet a second; those of hydrogen gas at 6,000 feet a second.

THE line of perpetual snow varies in different parts of the earth, depending upon latitude. Thus, at the equator it is 15,000 feet; in latitude 62° it is only 4,000 feet; and in latitude 71° it is as low as 1,000 feet above the level of the sea.—*S. Piesse.*

[For the Scientific American].

THE HESPERIANS.

[By Edward C.H. Day, of the School of Mines, Columbia College].

The Hesperians are one of those interesting families that intervene between well-marked groups, partaking of characters belonging to each, and thus confounding the systematist, who, forgetful that a system of classification, aiming to represent the system of nature, must be free from all "hard" boundary lines, attempts rigidly to define either. A butterfly, a sphinx or hawk-moth, and a miller or night-moth recall to the mind three very distinct objects. The night-moth is unmistakably indicated by its thick body; its very downy plumage; its wings displaying, when at rest, the upper surface, and generally that of the front pair alone; its hind wings folded, and the two wings on each side held together by a slender bristle on the one passing through a loop in the other (an arrangement technically termed "the bridle;" by its plume-like antennæ), and, above all, by its nocturnal habits. The butterfly, on the other hand, is equally well distinguished by its wings so large in their expanse when compared with the slender body—held in repose upright, so as to display the under sides—wanting all trace of the bridle, and with the hind pair never folded; by its antennæ threadlike, but terminating in a club-shaped expansion; and by its time of flight, in the full glare of day. Again, the narrow, lengthened, powerful wings—bearing much the same relation to those of the miller, as the wing of the falcon among birds does to that of the fowl—with its correspondingly strong and bird-like flight in the twilight hour, sufficiently distinguish the sphinx from the night-moths; while its thick, spindle-shaped body, its bridled wings, and its antennæ bent at the end into the semblance of a little hook, prevent its being confounded with the butterflies. But these associations of characters occur only in the type forms of each group; exceptions to almost every term of the above definitions may be found among some one or other of the less typical members. Thus there are "night-moths" and butterflies as crepuscular as the sphinx, and sphinges as nocturnalas the former; moths with their wings devoid of a bridle or a fold, and carrying them out of all accordance with the general rule; and so, too—and this is what interests us most at present—there are butterflies that have the club of the antennæ bent into a terminal hook, whose bodies are thickened so as to appear more or less moth-like, and whose hinder wings extend horizontally in repose, while even the front pair stand up by no means erect. Among these many, moreover, seem to assimilate somewhat in habits to the night-moths by preferring the deep gloom of the forest to the sunlit meadows or the open flower beds.

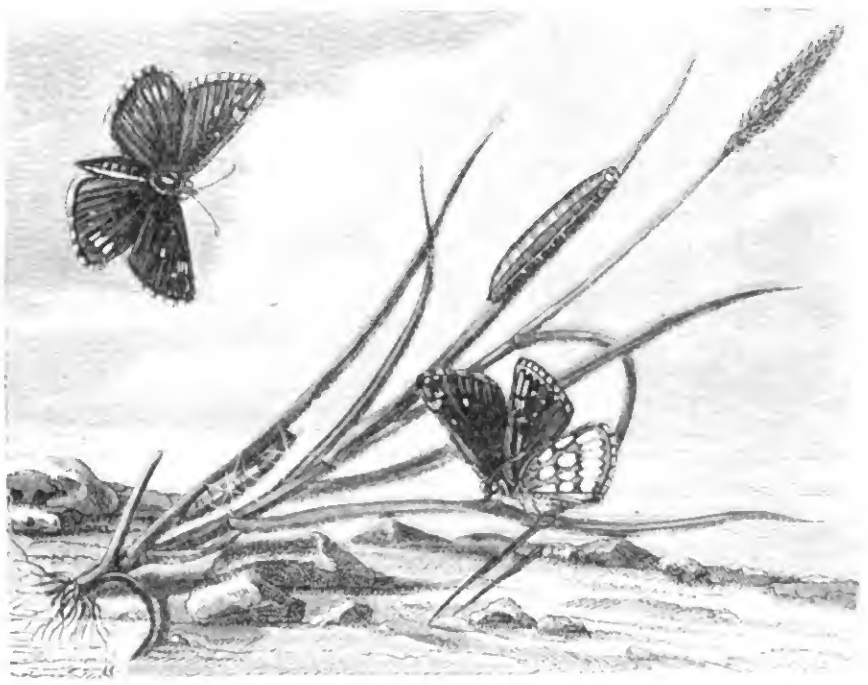
Such butterflies as these form the connecting link between the butterflies and the moths, standing lowest among the former; not that we mean that there is a direct passage from the highest moths through these to the higher butterflies, but rather that at some stage in the history of Lepidopters, these lowest forms branched away from a more "comprehensive" type, one that embraced characters now distributed among the three great groups, and that these have undergone less change than have the more highly specialized butterflies or the typical moths.

The Hesperians are popularly known as "skippers," from their peculiar jerking flight as they flit from spot to spot. The species figured is the *Pamphila aracynthus*, a small European form. The upper side of its wings is of a dark brown color, spotted with a few yellowish markings. The under surface of the hind wings is beautifully adorned with whitish spots encircled by brown, and from a fancied resemblance of these markings to tiny looking-glasses, this pretty little species is known in France as the "Mirror" butterfly. Its caterpillar feeds on grasses, and, according to Blanchard, in some points recalls to mind the caterpillars of the Pyralids among the night-moths. Wanting, however, as the perfect insect does, the hooked termination to the antennæ, and having but, comparatively speaking, a slender body it has not two of the most characteristic features of the skipper. Any person sojourning at this time of the year in the country may find a better example of the group in one of our native butterflies.

The *Eudamus Tityrus*, with wings expanding upwards of two inches, is a large and beautiful representative of an American genus of this family. Its upper surface is a rich glossed brown with greenish, marked with a band and spots of a dull yellow; beneath, on the hind wings, is a large pure white patch which renders this insect a conspicuous and pleasing object in our flower gardens, to which it frequently resorts. Its markings, when viewed close at hand, rather resemble blotches of paint laid on than the delicate shading of the dainty butterfly's plumage. Thick-bodied as it is, it is a strong, vigorous flier, so much so that, as Harris remarks, it is difficult to take it in the net without its doing itself injury. Its caterpillars, according to the same authority, feed upon the leaves of the common and viscid locusts, and "when quite small, conceal themselves under a fold of the edge of a leaf, which is bent over their body and secured by means of silken threads. When they become larger they attach two or more leaves together so as to form a kind of cocoon or leafy case to shelter them from the weather and to screen them from the prying eyes of birds.

"Although there may be, and often are many of these caterpillars on the same tree and branch, yet they all live separately within their own cases. One end of the leafy case is left open, and from this the insect comes forth to feed. They eat only, or mostly, in the night, and keep themselves closely concealed by day. These caterpillars are very cleanly in their habits, and make no dirt in their habitations but throw it out with a sudden jerk so that it shall fall at a considerable distance. They frequently transform to chrysalids within the same leaves which have served them for a habitation, but more often quit the trees and construct in some secure place a cocoon of leaves or fragments of stubble, the interior of which is lined with a loose web of silk."

Very similar are the habits of many other Hesperians. The cocoon of the "Mirror" is seen on the left of the engraving, formed of the blade of the grass folded over, inclosing the chrysalis, the whole being bound together by a loose network of silk.



METAMORPHOSES OF THE MIRROR BUTTERFLY.

Correspondence.

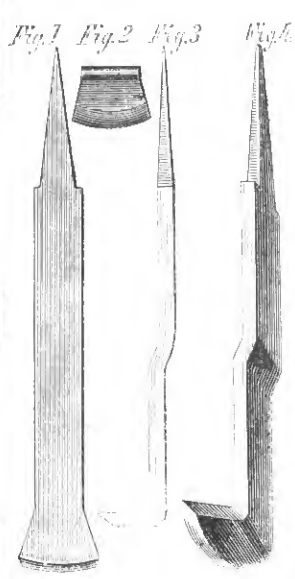
The Editors are not responsible for the Opinions expressed by their Correspondents.

Scraped Surfaces.

MESSRS. EDITORS:—I quite agree with Mr. Barber in most of his remarks about the use of the scraper. Trying to fit two surfaces together with a fine file and oil, is an exceedingly crude mode of doing such work. I think I may safely say it is utterly impossible to make a really good job with the file, because the file cannot discriminate between a small point, probably not half the size of a pea; and a good deal of the surrounding surface. But with a scraper the smallest point can be cut down and no other part touched.

A common mistake with an ignorant workman is to put too much marking on the surface which he is scraping. To make good work, the surface plate, or the part to which another piece is being scraped should at most be merely damped with oil; but generally a first-class workman uses absolutely no marking whatever to finish with. The two dry surfaces are simply rubbed together, when all the high points on the piece of metal being scraped, will be clearly shown by being polished in the rubbing, the low parts remaining dim.

Any kind of metal or composition, unless hardened, can be scraped, so there is no excuse whatever for new work not fitting perfectly. All working surfaces intended to be a good job, should be scraped, they will then remain good much longer than if merely filed, no matter how well that operation may be performed.



I never found any difficulty in using the three-cornered scraper. For instance I always scraped locomotive valve tables with it, as the flat scraper could not be used in many cases, and it worked quite well. I don't advocate the three-cornered one for flat surfaces where the flat one can be used.

The best form of a flat scraper is to have the point *thicker* than the body because a better cutting edge can be kept up than if the sides are parallel. To run the scraper down to a point is quite contrary to all I have ever used or seen. The point can either be square or angled—the angle being theoretically the better one.

WM. P. COWAN.

Brooklyn, N. Y.

Our Dwelling Houses.

MESSRS. EDITORS:—The admirer of good substantial workmanship can certainly find but little satisfaction in the method, or rather lack of method, in which two thirds of our common dwellings are now put up. Having interested myself in this matter recently, with a view to having a house built, the subject has presented itself quite practically.

There are always more or less of these dwellings in process of construction in this growing locality, so that "he who runs may read" in more ways than one, perhaps, in a high wind.

The greatest deficiency is in the foundation supports. Much experience and good judgment are necessary in making a good cellar wall; any novice can fill in chinks with small stone so as to give a wall a fair surface and appearance, but it is quite another thing to arrange a mass of unshapely stone into a wall so that it shall rest firmly and not settle.

I happened into one of these structures recently, which is an average instance of about two thirds of the common houses built here. This one is some 36 by 40 feet, three stories, including the modern double pitch or "French roof;" it was nearly inclosed and the roof about all on, and some of the partitions are being fixed for lathing. I noticed that the cellar wall was made of small flat stones which were so unskillfully laid that many of them were falling out, occasioned doubtless from the jar incident to putting up the building above. Under this whole area of 36 by 40 feet there are but five intermediate supports; these consist of two 2 by 3-inch partition studs, and three chestnut posts 4 to 6 inches diameter; one of these is crooked some four inches out of line, and rests upon a sort of cobble-stone sunk partially in the gravel, presenting a surface, I venture to say, of not more than seven inches square to the gravel, and of less than two inches to the post; under another post the only visible rest was a fag end of a 2 by 6 joist resting upon the ground; one of the posts had a fair rectangular piece of granite for its rest, but it was much too small for a ground rest, it should have beneath it another granite block, from 12 to 18 inches square. The accumulating weight above has already bent one of the 2 by 3 posts to the form of a bow.

Now I venture to say that the ten tuns or more of mortar will go on to the walls and ceiling above upon this inadequate and ill-arranged support. The consequence will of course be the settling of the whole central portion, at least, of the floors some two or three inches, more or less, or until somebody is frightened into sticking under some more props.

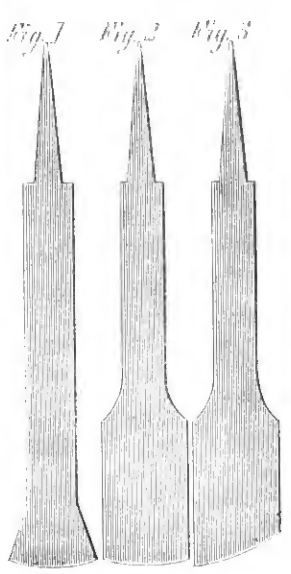
A large house just finished with all of the latest conveniences and in the best style, on Washington street, was the subject of precisely the ordeal indicated above. And from my late observation I am inclined to say two thirds of our houses are thus inadequately supported. F. G. W.

Worcester, Mass.

Scraped Surfaces.

MESSRS. EDITORS:—I am much interested in the discussion on the subject of valve scraping, I have been scraping valves for fifteen years from three inches square to three feet square. But none of the scrapers as shown answer the purpose as well as the ones I use. But doctors differ.

I use an old file; I find mill saw files, about twelve inches long, the best. I grind out the chisel cuts on the end, then heat a cherry-red, and draw out thin, not hammering it on the edge, as that is apt to open the grain. It naturally widens at the point (Fig. 1); I then bend a hook about five eighths of an inch long, and make a slight bend in the center of the file, as in Fig. 3. I then harden in salt and water as hard as it will make it, plunging it in the entire length when it is hot. If held only in the water a short distance they often crack at the surface of the water. I then grind straight on the inside and beveled at the outside side, as shown in Fig. 3. Oilstone across the grain of grinding, and you have a good scraper for any sort of work. The scraper cuts by drawing towards you. I never could scrape shoving the tool from me. I suppose Mr. J. E. Barber uses one of his sideways, and one push from him. I use the right hand on the handle, the left on the back of the scraper to put on the pressure.



JOHN J. BINGLEY.

Hanover, Pa.

Speed of Circular Saws and Saw Mills.

MESSRS. EDITORS:—It is laid down in mechanics that the speed of a circular saw should be about two miles per minute, that is, the periphery of the saw should run nine thousand; or a little over that number of feet per minute.

Having had much experience in the building and the running of saw mills, I have found that a greater speed could be used with safety, of which I will give an example, a mill that I finished and put in operation about eight months ago for Messrs. Milner & Caldwell, of Greenville, Butler Co., Ala., they having employmed me to build them a first class saw mill. I was in nowise to be trammeled, and

everything was left to my direction, which gave me an opportunity of testing a very high speed, together with a heavy feed on a large saw, which has proved a success.

The size of the building was 34 × 100 feet, and two stories high. Size of engine, 15 × 30 × 82, with 83 revolutions per minute. Three cylinder boilers, 36 in. diameter by × 30 feet long. Fly-wheel, 20-in. face × 12 feet diameter; weight, 8,000 pounds.

From the fly-wheel, with a 20-in. belt is driven a 4-in. counter shaft, with a 4-ft. pulley. A 6½-ft. pulley on countershaft, with a 16-in. belt to a 2-ft. pulley on saw mandrel, drives the saw, which is 66-in. diameter, running 800 revolutions per minute—14,000 ft. per minute—which is about 5,000 ft. per minute over the standard. With this very high speed the saw cuts 3 in. to the revolution, making a 3-in. feed.

On the 22d of April we tested the capacity of the mill, which cut the following amount of lumber:

1,501	plank, 1 × 12 × 20½ ft. long	30,770 ft.
80	" 2 × 12 × 20½ "	3,280 "
	Total	34,050

In sawing the above, 97 logs were cut up, the most of which were very large. The mill was run just 12 hours; during the first 6 hours some time was lost in having to take up the saw belt, and we cut but about 15,000 ft. of the entire amount; the last 6 hours run we cut over 19,000 ft. Has it ever been equaled? C. H. CRANE.

Greenville, Ala.

Mississippi State Fair.

MESSRS. EDITORS:—In a late issue of your paper you were kind enough to invite information concerning fairs yet to be held. The Mississippi State Fair will be held at Jackson, commencing Monday, October 10th, and will continue six days.

For a beginning, our fair last year was quite a success, and encouraged thereby, our arrangements for the next are being made on a more extensive scale. The premium list is now being published, and will be sent to any address on application. We invite manufacturers and inventors to come and see us, and show themselves, and whatever they may have new or old that will economize labor. So anxious are the directors of the fair to have a full exhibition, it has been determined to make no charge for the entry of any article. The only fees will be for individual admission. Arrangements will be made, as far as possible, for reduced transportation for visitors and machinery for the fair.

I will add that the Hon. Horace Greeley has been invited by the directors to deliver the annual address, and we are hopeful of his acceptance. J. L. POWER.

Jackson, Miss.

The Permutation Theory.

MESSRS. EDITORS:—The chief difficulty which appears to operate in the minds of many, preventing a recognition of the logic of the so-called permutation theory, referred to in the SCIENTIFIC AMERICAN a few weeks since, is, that all particles are said to be capable of infinite subdivision, and that consequently there could be no beginning (I use the word for want of a better) to the initiation of the grand plan of permutation. Allow me to say that this argument will fall to the ground before the self-evident fact that there must be a limit to these subdivisions, otherwise all matter would be homogeneous. There is a limit within which particles will combine—this is the lowest working size. Admit that God, or some great acting principle, made the earth, the particles of which it is composed were all individualized previous to said creation. Who can deny this? N. F. ENGLISH.

Hartland, Vt.

Cleaning Bolting Cloth.

MESSRS. EDITORS:—Reading in your "Answers to Correspondents" the difficulty that a millwright is in with respect to his bolting machine, I would like to give an experiment I saw tried with one that would not perform near the amount it ought to do, although experimented on by some of the best millwrights to be found outside the city I lived in. As a last resource, the millwright with whom I worked (the owner of the mill had a prejudice against him before this) was sent for. He had boxwood balls of 2½ inches diameter turned, with ⅝-in. holes in them. He took pieces of ⅝-in. iron with T heads, and fastened them to the shaft of the bolter; the other end went into the outer ribs a short distance.

The tapping of the balls as they fell from the shaft to the ribs and back to the shaft, made the machine perform, with ease, double the quantity of work, and brought double the quantity of work to the millwright's shop from the same mill.

New Orleans, La. FRANCIS CARROLL.

To Prevent Bolting Cloths from Clogging.

MESSRS. EDITORS:—Your correspondent C. A. L., of Tenn., in SCIENTIFIC AMERICAN of June 18th, page 402, wants a remedy for clogging in his bolting cloths. The remedy I would give would be to tear them off and get new ones, and when he starts his new cloths, not to bolt fresh meal from the stone but run through some ship stuff, with grindings over middlings, say twenty bushels. This scours off the sizing or glutinous matter. I have never had any trouble with cloths clogging when I have taken this precaution.

N. S. HARRINGTON,
Foreman of Cleveland and National Mills.

Cleveland, Ohio.

How to Clean Bolting Cloths.

MESSRS. EDITORS:—Let C. A. L., of Tenn., select a dry day; clean his bolting cloths thoroughly inside and out, also his bolting chest, and then pass the flame of burning alcohol rapidly under the whole cloth.

Extreme care must be observed to avoid damping the cloths. AN OLD MILLER.

Macon, Ga.

Why Should Brass Lamps have Iron or Tin Bottoms?

MESSRS. EDITORS:—Is it generally known that petroleum acts upon tin or iron vessels corrosively? My lamp had a tin bottom, and when it commenced leaking the bottom was thin enough to thrust the fingers through as if it were paper. The tinman says that the coal oil contains some of the refining ingredients, and that these cause the corrosion. Why should brass lamps have iron or tin bottoms? J. A. S.

Philadelphia, Pa.

Wanted—A Dye to Color Pine and Light-colored Woods in Imitation of Black Walnut.

MESSRS. EDITORS:—Can you or some of your readers give some method of dyeing (not daubing as what is called "graining" is usually) some of the lighter-colored and cheaper woods—as pine, chestnut, ash, butternut, whitewood, etc.—to the natural color of walnut? The preparation should act as a dye, and not lie in a coat on the surface, thus showing the fine lines, of the natural grain of the wood used, which I have never yet seen truly imitated. I have the impression that many of the woods above named could, if treated in the manner suggested, be made to look equally well with walnut. BUILDER.

Brooklyn, N. Y.

How to Put Up a Wire Trellis or Fence.

In this season, when most of our rural subscribers, and some, at least, of those who reside in cities, are paying attention to the decoration of their grounds, it may be interesting to know how a cheap wire trellis may be put up. Mr. S. Mitchell gives the following practical advice upon this subject in the columns of the *Country Gentleman:*

"In putting up a grape trellis or a wire fence, the end posts should be strong, well set, and braced by a brace of seven or eight feet long, the upper end resting in a notch cut near the top of the post, and its foot against a stout stake driven down nearly even with the ground; three-quarter-inch holes should be bored through them the distance apart the wires are desired to be. For a grape trellis, No. 12 annealed wire is large enough, and No. 9 for fence. When first put up, they will be covered by a thin coat of rust, but seem soon to glaze over, and remain perfect for a great number of years. The posts should be set from twenty to twenty-four feet apart for a grape trellis, and can be driven with a heavy iron maul, in holes made by a heavy iron bar. I have one I use, made of square bar iron, the handle rounded and the end drawn down to a perfect point and hardened. It weighs about forty pounds, and will go down through coarse gravel, or even quite large stones, with the greatest ease.

"I see, in the agricultural papers, many elaborate descriptions of instruments for stretching the wire. I use a round, hard-wood stick, twelve or thirteen inches long, and two inches in diameter, with a small hole through the middle, just large enough to pass the wire through, and another near one end large enough to put in a peg for a handle. When ready to stretch the wire, lay down two coils side by side at one end; then let one person take the free end from each coil in his hands, and travel the length of the fence or trellis, while another person stands by the coils, letting the wires pass through his hands, to prevent fouling as it uncoils. When the end is reached the wires should be passed through the auger holes in the end post, and a hard-wood pin driven in firmly on the outside, and the wire coiled several times around the protruding pin to prevent its being drawn out while being strained. The wire should be fastened to each of the middle posts, by driving a small staple over it, but not quite home (the staples can be purchased by the pound in the market the same as nails); then draw up the slack and break the wires sufficiently long to pass through the end of the post, and through the small hole in the windlass before described, and bend down, so that it will not slip when commencing to turn. Then take hold of the peg in the end and turn, coiling the wire around it until it is strained as tight as desired; then drive in a peg and unwind from the windlass and coil around the peg as before. Some recommend to drive home the staples in the middle posts. When this is not done, the wires can be tightened by driving out the peg and applying the windlass as before.

"I use three wires for grape trellis—the lower one about eighteen inches from the ground, the second twenty inches above, and the third about two feet above the second. The wire can be readily spliced by twisting the ends together, making about two and a half inches lap, and bending back the ends, so that they will not slip while being strained. From twelve to fifteen rods is long enough for one stretch, unless the staples holding the wires to the middle posts are driven home, when the distance does not matter."

Salad.

In every country salad is composed of nearly the same ingredients. Many vegetables contain potass, and when they can be eaten raw they are excellent antiscorbutic food. Boiling them would remove the potass; thus their principal virtue would be lost. The Romans ate salad freely, mixed with olive oil. The general ingredients of a salad are well known. In spring and summer, cos lettuce, mustard and cress, water cress, and radishes form the staple; in the autumn, endive and cabbage lettuce predominate. Nothing spoils a salad so much, both in appearance and flavor as cutting it up too fine. Every atom should maintain its individuality. Radishes cannot be cut too fine, but the slices should be in rings, and not dice shape. Onions must remain a matter of taste; but not so as regards mint. Every salad should contain from three to six leaves of young mint, as it greatly assists its digestion. No salad can be properly made without one or two hard boiled eggs, because the yolks are necessary to blend the oil. The mixture should be made thus: Boil two eggs quite hard; when done take them out of the saucepan and put them into cold water. This causes the eggs to shrink, and the shells can easily be removed without disfiguring the white. Cut each egg into three parts, and remove the yolk into the salad bowl; cut the white into fine rings, some of the best of which should be preserved to place on the top of the salad when served. With a wood or silver spoon break up the yolk in the salad bowl, and add one tablespoonful of oil; these ingredients rub together, and they will blend; then add at least three tablespoonfuls more of oil, and again rub all together; now add a teaspoonful of moist sugar, again rub, and all will blend. Now add gradually, a little at a time, the vinegar, in quantity about twice as much as the oil used; lastly, put in pepper, salt, and ready-mixed mustard, the latter but little; but on no account use mustard that has not been previously mixed with water. A little taragon vinegar, used scantily, improves every salad. It is very essential to mix the ingredients in the order laid down as above. When this is carefully done an excellent salad will be the result—soft, yet aromatic; creamy, but not greasy.

There are true chemical reasons for mixing yolk of egg with oil, as there are for mixing flour-of-mustard with water, and not vinegar; but this is not the place for examining them—the facts stated must be accepted. It is the general want of the knowledge of how to blend the oil that causes the common remark, "I am very fond of salad, but I'll not take any oil, thank you." Of course, served up as it frequently is, all floating and greasy, few things can be more objectionable, unless it be that rancid potion sold in ring bottles in shops under the name of "Salad Cream." Avoid this. Beetroot, as a staple to a salad, is not used sufficiently in England. At least half a good-sized beet should be cut up with every salad. It is digestible, nutricious, and in general favor.—*Septimus Piesse.*

Bank Alarm Telegraph.

For some time past the bank officials of this city have been engaged in looking after some system of protection or alarm, to work in connection with each of their institutions to the headquarters of the fire alarm telegraph, where some person is always on duty. Mentioning their desires to Superintendent A. L. Whipple, of the fire alarm telegraph, that gentleman's efficient aid was enlisted, and to-day the public will have an opportunity of witnessing the operation of the new and beautiful machine which will in future perform an important part in guarding the millions of treasure locked in the bank vaults of this city.

The electro-magnetic watch clock is a beautiful piece of mechanism, inclosed in a black walnut case, about six feet high and two feet wide. It consists of a magnet, with a recording dial, clock works, and a signal bell. From this clock run eleven wires, one to each of the banks, Commerce Insurance Company, and the Gas Company's offices. Two watchmen will be employed, whose duty it will be to visit each bank at stated times during the night and give signals, which are recorded on the dial of the clock in the fire alarm office, showing the time that the signal was given from any particular bank or office.

The order in which the banks must be visited will be changed each night, as also the time that the signals shall be made from each; the watchman must make the visits according to the programme handed him every night by Superintendent Whipple. In this way no collusion can be formed between the watchman and evil disposed persons, who may want to operate on any safe or vault.

If this signal is not given within five minutes after the appointed time, the man on duty at the fire alarm office communicates with the office of the Superintendent of Police, and an officer is immediately dispatched to the point where the trouble exists, and from whence no signal has been sent. In this way freedom from burglary is insured, and bank officials may rest peacefully at night, without any fears of the depredations of the bold rascals who have heretofore made raids on these moneyed institutions. The work has been well done, so far as we have examined, and we are proud that Mr. Whipple has shown such a thorough knowledge of his profession as an electrician as is evinced in the work just completed.—*Albany Argus.*

ORANGE MARMALADE.—Cut the orange in quarters, turn out the pulp, and put the peel in water for twenty-four hours. Change the water several times; turn the pulp from the skin, and pick out all the pips; squeeze all the juice you can; boil the peel until tender; turn it out and let it drain, then cut it crossways, very thin; and to every pound of fruit put two pounds of sugar, and to every pound of sugar put a quarter of a pint of water. Let the sirup boil, and skim it; then put the fruit in, and boil very slowly for one hour and a half. —*S. Piesse.*

As tallow-melters, oil-boilers, varnish-makers, and others, are very liable to accidents from fire, Dr. Piesse suggests to them the application of Sir H. Davy's discovery of wire gauze, as in the miner's lamp, for the prevention of accidents, by covering the boilers and vats during operation with a drum-head or dome of wire gauze.

THE SCIENTIFIC EDUCATION OF WOMEN.

[From Nature.]

The feature which will probably most clearly mark the year 1869 in the view of the future historian of education, will be the definite recognition of the rights of woman to all the advantages of education accorded to men. The advance of public opinion within the last few years on all subjects relating to the legal, social, and educational position of woman, has indeed been so rapid, that the man whose words were only quite recently listened to by his friends with a condescending smile of pity, is now scarcely in advance of his times. As it is generally believed that the movement has yet far from reached its full development, and the course in which it has been so far directed having been in the main sound and excellent, we would still wish to suggest to its promoters whether the curriculum of subjects taught under the auspices of the various associations may not be somewhat widened by a more liberal infusion of the scientific element. The ability of women to appreciate instruction by the highest teachers of natural science has as yet hardly been tested. The high position occupied by a few women like Miss Martineau and Mrs. Somerville as writers on political and natural science cannot be taken to prove the capacity of the whole sex; but we think that so far as opportunity has yet been offered, the evidence is entirely favorable.

The programmes of the lectures to women on physiography, physics, and botany, recently delivered at the South Kensington Museum, by Professors Huxley, Guthrie, and Oliver, show at least no want of confidence in the capacity of their pupils. The first of these courses has already been given substantially to a mixed class of boys and girls at the London Institution, and in the results of the examination of that class, the girls had decidedly the advantage over the boys. In most of the large towns of Great Britain courses of lectures to ladies have now been delivered during the last two or three years by eminent professors of the various branches of literature; in many of these rigorous examinations have been held at the close of the courses; and where this has been done, there is but one expression of opinion as to the quality of the work executed. At London, Edinburgh, Manchester, Liverpool; in English literature, mathematics, experimental physics, mental philosophy, the testimony is uniform, that not only can women compete with men in the qualities essential for severe and successful study, but that in many respects their average attainments are higher than among the working members of a university. A careful examination of the reports of the various educational associations convinces us that the statement is decidedly within the mark.

Among so many testimonies to the same effect, it seems almost invidious to pick out one; but we cannot forbear quoting from Professor Fraser's report of his class of logic and mental philosophy at Edinburgh: "Sixty-five students enrolled. Forty-eight of these shared more or less in the examinations and essays of the class. I found, as the session advanced, that I had at the outset underrated the mental power and persistency of as able and zealous a set of students as I have ever had the good fortune to conduct. . . . . In the examination the average of marks gained, was about 55 per cent; one twelfth of the class gained more than 80 per cent of the marks, and only one had less than 25 per cent."

The Edinburgh Association stands out from most of its kindred societies in being formed on a decidedly more academical basis. The courses are longer, averaging about forty lectures each, and, consequently, deeper and more thorough: the teachers are all university professors, and the aim of the Association is, as it were, to form a distinct faculty of the University. So far as we can judge, the success of the Association has justified the views of its founders. Many advantages no doubt result from immediate connection with a great center of learning like the University of Edinburgh, a connection which has hitherto been denied to female education. We are inclined to think that the "College for Women" may have made a mistake in establishing itself in a locality "midway between London and Cambridge." The College will not share in the life of the University; the Cambridge professors will not feel the Hitchin College a portion of their own system, unless the College is locally associated with the University.

We have already alluded to the comparative absence of natural science from the programmes of the ladies' educational associations; this is not so strikingly the case as it was last year. The London Association is making arrangements for some scientific classes next session; at Edinburgh Professor Balfour is trying the experiment of a class of botany; classes for zoology and geology are included in the Manchester curriculum for 1870–71; as well as one on logic by Professor Jevons; natural science has a place both in the entrance examination for the Hitchin College and in the College course, though it has not yet been taught; while chemical classes have already been conducted in several localities by Professors Williamson, Roscoe, and others, with marked success. We notice with great pleasure the movement at Cambridge for the instruction of women to which we have referred elsewhere. Here a wide field is opening for the future, and one which it will surprise us if women do not make especially their own.

In the training of boys we have recently awoke to the discovery that a complete education implies something more than an intimate acquaintance with two dead languages. There is no danger that we shall ever underrate the value of a critical acquaintance with Latin and Greek, as requiring a mental training which no other studies can give; but while a classical education imparts the highest culture possible to the intuitive faculties, it scarcely brings into play the powers of observation. Now, it is in these very powers of perception, as distinct from conception, which the natural sciences cultivate, that woman has naturally the advantage over man; and we may therefore *a priori* conclude that their study will be specially within the range of her powers. Another consideration is also worthy of notice by those who are looking for "new careers for women." At a time when we are beginning to recognize the importance of a scientific training as an essential portion of a liberal education, we find that our teaching powers fail us. The number of really competent teachers of science has by no means kept pace with the extension of a desire for instruction; the leading men in every branch are overwhelmed with work; and the younger men to whom they can with confidence intrust a portion of their labors are by no means sufficiently numerous. It is thus not women only, but men, the whole human race, that is stunted in its intellectual development at a time when its growth should be the most rapid, by the practical restriction to one half of the race only, of the means of acquiring the ability to help in this development.

We next touch upon a subject of great delicacy; we refer to the instruction of women in medicine and surgery. There is an important distinction between this and all other departments of science. While it is competent to any one to teach chemistry, geology, or botany, and his success as a teacher will depend on his competency, the teachers and practicers of medicine and surgery form a guild, a professional trades' union protected and licensed by the Government. It is in the nature of guilds and monopolies to be exclusive; and when we find that the medical profession is united almost as one man (with a few honorable exceptions) to resist the admission of women into its ranks, it is only what might with confidence have been predicted. The instinct of self-defense is a strong one; and if any evidence is required of the extent to which self-interest has entered into the causes of the opposition by the profession to the medical training of women, we need only to refer to the "seven reasons against the admission of ladies to the profession," given in the *British Medical Journal* for May 7th. Into the abstract question of the utility of monopolies we need not enter: those who are excluded from their benefits are perfectly justified in using every legitimate effort to overthrow them, and in claiming the assistance of those who believe in the universal adaptation of the principles of free trade. Seldom have greater persistence and self-denial been shown than by those few women who have labored long and hard in this country, America, and France, in attempting to open to their sisters the doors of the medical profession. Careless of cruel misrepresentation, of public slander, of private persecution, they have held nobly on their course, and their services to mankind will one day be recognized.

Few have yet realized the enormous gain that will accrue to society from the scientific education of our women. If, as we are constantly being told, the "sphere of woman" is at home, what duty can be more clearly incumbent upon us than that of giving her the opportunity of acquiring a knowledge of the laws which ought to guide her in the rule of her house? Every woman on whom the management of a household devolves may profit by such knowledge. If the laws of health were better known, how much illness and sorrow might be averted! What insight would a knowledge of chemistry afford into the wholesomeness or unwholesomeness of different articles of food! What added zest would be given to a country walk with the children, or a month by the seaside, if the mother were able to teach the little ones intelligently to observe and revere the laws of nature! Above all, what untold sufferings, what wasted lives, are the penalty we have paid for the prudish ignorance of the physiology of their bodily frame in which we have kept our daughters! These considerations have had far too little place with us at present.

We trust that a new era is dawning upon us; may the higher education of women be pursued in the admirable spirit of the last report of the Edinburgh Ladies' Educational Association: "So far as we can see, cultivation does for women what it does for men—intensifies every moral attribute in proportion to the mental growth. Those who must go into the world go out with a truer courage, founded upon a nobler estimate of work; those whose duties lie within the circle of home find them invested with a new and vivid significance from the higher elevation, and consequently larger views, of their own minds; and, finally, as 'woman is not undeveloped man,' we believe that womanhood can only be made more truly womanly, as manhood is made more truly manly, by the utmost use of the possibilities of high cultivation."

The Apparent Size of the Moon.

This question which has probably interested every schoolboy in the world, has latterly been discussed at length in the columns of *Nature*, and various opinions have been given upon the subject. The last one given, and in our opinion the best explanation, is that of the celebrated Professor Helmholtz, which we extract:

"The moon appears larger when she is near the horizon than when she is high in the heavens, although in point of fact owing to atmospheric refraction her vertical diameter ought in the former case to seem less than in the latter. Even Ptolemy and the Arabian astronomers were perfectly aware that the true reason why the moon appears larger when seen in the horizon, is that she then appears further off. The real question therefore is, why the sky should appear further from us at the horizon than it does at the zenith. Various causes have been assigned for this fact, and I am myself disposed to admit that there are several causes which combine to produce this effect, so that it may be difficult to say which of these causes predominates in any one case.

"First of all we must remember that there is no decisive reason why the starry firmament should appear to us to be a spherical surface. It certainly reveals to us objects (the stars) which are at an infinite distance; but hence we can only infer that it may assume the appearace of any such indeterminate surface as any motive whatever may lead us to ascribe to it. If we were floating in empty space, and could survey it in its whole extent at the same moment and in all directions, or if its movements were so rapid as to make a distinct impression on the senses, there might be more reason for assigning to it a spherical rather than any other kind of surface. In point of fact, however, its apparent form and apparent direction are constantly changing, according as the portion we happen to see is more or less inclosed by various terrestrial objects, and according as we fix our attention on a higher or a lower spot. We shall see further on that we are naturally disposed to regard it as a plane surface, at right angles to the line of sight, whenever both eyes are steadily fixed on one point.

"But with the canopy of cloud the case is entirely different. The clouds in general are so far from us that the criteria for judging of distance which binocular vision or the movement of our own bodies can supply are utterly useless. But the clouds are often disposed in parallel lines, they generally drift with a constant velocity and in the same direction; when near the horizon they appear like bars across the sky seen edgewise, and so lighted that it is easy to perceive they are bodies whose horizontal extension is foreshortened by perspective. All these indications serve to give us the impression that the true form of the canopy of cloud, at least in the zenith, is that of a very flat dome. On the horizon indeed these indications cease to serve us; there the clouds, like the mountains, appear to be evenly painted on a vertical or nearly vertical background, which gradually passes into the surface of the earth below, and into the firmament above. Now, since the senses supply no criteria by which we distinguish between the distance of the clouds and that of the sky, it seems only natural that we should ascribe to the one the ascertained form of the other, so far, at least, as we can separate them. This, I believe, is the way in which our conception of the sky, as a flat domelike vault, must originate, vague, variable, indefinite as that conception undoubtedly is.

"Moreover, the apparent increase in the size of the sun or the moon is never very striking or decided, except at those times when the air near the horizon is heavily charged with vapor, and when, as a necessary consequence, the heavenly bodies in question only shine with a very feeble light; we have then the very same effect with which we are perfectly familiar in the case of distant mountains. They appear more distant than they do when the air is clear, and therefore larger. Moreover, when suitable terrestrial objects happen to be placed near the horizon, they add very much to the effect. When, for instance, the moon sets near a tree some twenty feet in diameter, and about 1,000 yards off, as she subtends the same visual angle, and is known to be far more distant, she appears to be very much larger; whereas, when the moon sets behind a flat horizon, there is no object of comparison to enable us to perceive that her small *apparent* may represent a very great *absolute* magnitude.

"When I look at the moon reflected from a piece of parallel glass, so that her image appears to be very near the horizon, I do not find that the image looks decidedly larger than the moon herself seen directly high in the sky, although in this way it is easy to compare the apparent magnitude of the reflected image with that of the terrestrial objects seen together with it. In this case it is evident the reflected image has not the effect of being seen through the vaporous portion of the atmosphere.

"To my eye, the apparent increase in magnitude near the horizon is much more apparent in the case of the moon than in that of the sun. When the form of the sun can be distinguished at all, his light is generally so dazzling that we cannot look at him steadily, and consequently cannot compare him directly with any terrestrial objects that happen to be on the horizon. Even in the case of the moon when the sky is clear, the delusion is not so apparent. In all cases the delusion depends in a very great degree on the state of the atmosphere."

Polishing Wood Carving.

Take a piece of wadding, soft and pliable, and drop a few drops of white or transparent polish or French polish, according to the color of the wood. Now wrap the wetted wadding up in a piece of old linen, forming it into a pad; hold the pad by the surplus linen; touch the pad with one or two drops of linseed oil. Now pass the pad gently over the parts to be polished, working it round in small circles, occasionally re-wetting the wadding in polish, and the pad with a drop or so of oil. The object of the oil is merely to cause the pad to run over the wood easily without sticking, therefore as little as possible should be used, as it tends to deaden the polish to a certain extent. Where a carving is to be polished after having been varnished, the same process is necessary, but it can only be applied to the plainer portions of the work. Plane surfaces must be made perfectly smooth with glass paper before polishing, as every scratch or mark will show twice as badly after the operation. When the polish is first rubbed on the wood, it is called the "bodying-in;" it will sink into the wood and not give much glaze. It must, when dry, have another body rubbed on, and a third generally finishes it; but if not, the operation must be repeated. Just before the task is completed, greasy smears will show themselves; these will disappear by continuing the gentle rubbing without oiling the pad. You should now be able to see your face in the wood, at least, so says the *Cabinet Maker*, from which we take the above directions.

Improved Ballard Pavement.

Wood pavements seem to be gaining in public confidence, especially for light driving. At least this would seem to be a legitimate inference from the fact that their use is constantly extending. In this city and in Brooklyn the area of wood road surface has greatly enlarged during the past two years, and our observations in other cities which we have visited show that these roadways are gaining in popularity elsewhere.

The defects which existed in the earlier wood pavements have been some of them removed; and those at present laid are much better than the first ones.

We herewith give illustrations of a new claimant to public favor in this field, being an improvement on the Ballard pavement illustrated and described in our issue of April 23d of the present year, and which it is thought is adapted to heavy trucking as well as for lighter vehicles.

The accompanying engravings show the shape of blocks and manner of laying the improved Ballard pavement, which heaviest loads are driven. It would be interesting, and we hope to see an experiment with this pavement on our thoroughfares which are subject to the heaviest use and wear.

This improvement was patented July 12, 1870, and is owned by the Ballard Pavement Company in connection with their patents for wedge-shaped blocks, wedge-shaped interstices, wedge-shaped or key filling, etc. Patents have been applied for through the Scientific American Patent Agency, in England and other foreign countries. The office of the Ballard Pavement Company is No. 117 Broadway, New York.

Fig. 1

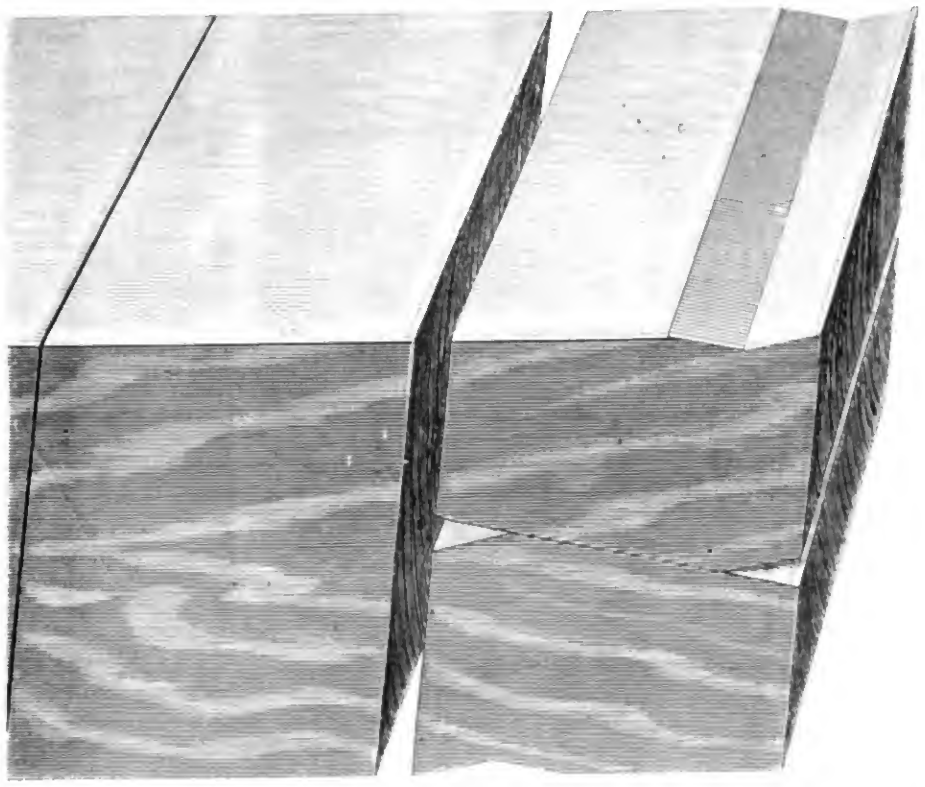
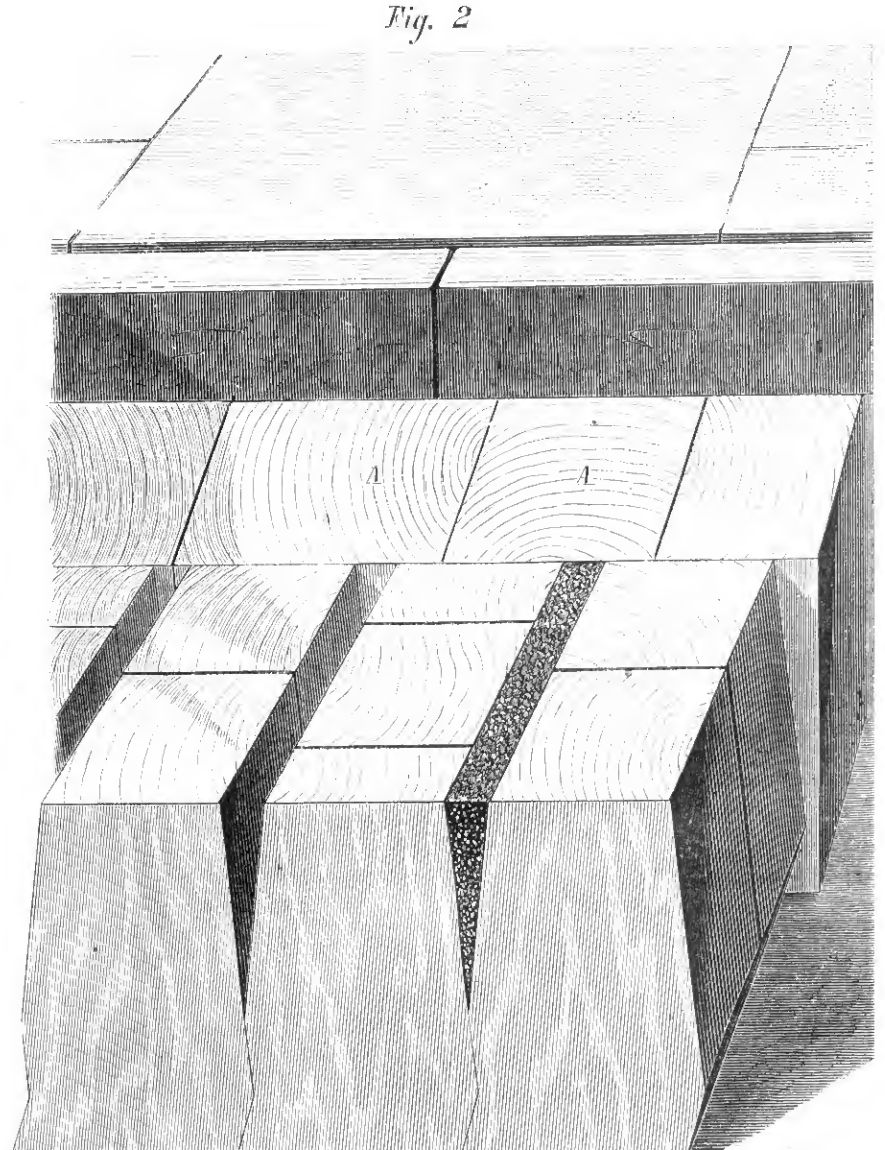


Fig. 2



IMPROVED BALLARD PAVEMENT.

the inventor is confident reaches the highest point of excellence at a much lower price than any other pavement now in use can be constructed. It seems simple, stable, and durable, and with a given class of material, its first cost is less than any other wood pavement. The lumber for the blocks may be sawed any convenient length and of any size, from three inches to the full size of the log or timber one way, and should be seven inches the other way. In sawing the blocks there is no waste of lumber or labor, each cut of the saw producing a block, which is so divided by the splitting saw as to form two broad-based, wedge-shaped blocks (Fig. 1), which are then run between two revolving cutters, making them exactly the same thickness at the bottom, and the proper shape for locking into each other, as shown in Fig. 2. This is done as rapidly as the blocks can be handled, and with the slightest waste of lumber.

This form of the blocks does away with the necessity for the objectionable wood flooring, and thus saves, after fitting the blocks, over eight feet of lumber to the square yard of pavement. The blocks when set, as shown in Fig. 2, leave a wedge-shaped opening at the top, to be filled with concrete thoroughly rammed.

The blocks rest upon a foundation of simple earth and sand properly rolled; and this is all that goes to make up this most simple and yet it is claimed, solid and complete pavement It is laid without nails, without strips, without pickets, and without a wood flooring. The blocks being of the same thickness at the bottom and fitting into each other, they can be laid with perfect regularity and great rapidity. One or more blocks can be taken up with great ease by removing key blocks, A, which are placed next to the curb; and it thus combines the advantages of a single block pavement, and is at the same time a solid and continuous structure.

For the manner of cutting the wedge-shaped blocks, we refer to the SCIENTIFIC AMERICAN of April 23, 1870.

These peculiar blocks of wedge shape, interlocking as they do at the bottom, and covering the entire surface of the carriage-way, when framed and keyed, constitute an unbroken arch, and, it would seem, render it impossible for one block to settle below another, without moving the whole pavement on the street laterally.

The combination of the three principles, of the broad-based, wedge-shaped blocks, covering the whole surface, the wedge-shaped key or filling, and the interlocking of the blocks, makes, we are assured, a pavement of such firmness and sustaining power that it is suitable for streets over which the

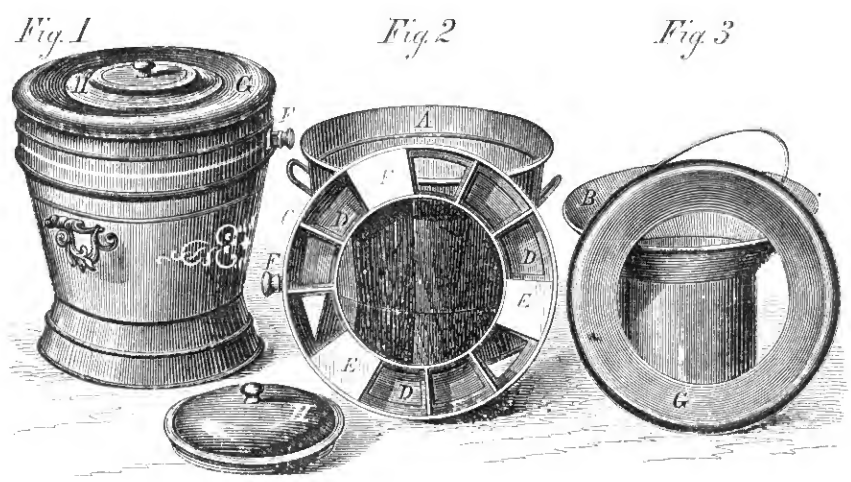
Bliss' Portable Earth Chamber.

Having already indorsed the earth-closet system in unmistakable terms, and assigned what we deem ample reasons for favoring its general adoption, we may, without preliminary remark, proceed to the description of a new, cheap, convenient, and portable earth closet or chamber, of which our engraving gives a complete view, and also details of construction.

Fig. 1 is a view of the apparatus as it appears when closed. It is composed of the five parts, shown in Figs. 2 and 3. A being the outside shell case or bucket, and B an inner bucket or pail flaring at the top so that its upper and outer edge meets the inner side of A. The flaring portion makes a sort of funnel, by means of which the earth discharged from the chambers in the piece, C, hereafter to be described, is conducted toward the center of the internal chamber, B. This chamber or bucket is provided with a bail, by which it can be lifted out to be emptied and cleansed.

In putting the apparatus together, B is first placed in A, as above described, and the part, C, is placed over A and B. In C are formed chambers, D, each capable of holding one half a pint of dry earth. An annular bottom forms a common floor to all the chambers, D. In this bottom are formed three apertures corresponding to the parts marked E. The annular floor being turned by means of a latch knob, F, till its apertures are brought under the parts, E, the chambers, D, are filled with earth, the annular seat, G, is placed over the part, C, the cover, H, is placed upon the seat which completely closes communication with the interior, and the apparatus is then ready for use.

Fig. 1 Fig. 2 Fig. 3



BLISS' PORTABLE EARTH CLOSET.

The fecal matters are covered with earth by turning the annular floor under the chambers, D, a distance equal to the width of one of the chambers, D; stops being provided to regulate the distance, and the floor being turned by means of the latch knob, F, as above described. This brings the three apertures in the annular floor underneath three of the chambers, D, equidistant from each other, and the earth from these chambers falls toward the center, covering and deodorizing the dejections. There being nine chambers, the apparatus may be used three times before emptying.

The object of this invention is to supply a small portable earth chamber, which, by its low price and convenience, will secure to families of moderate means the domestic comfort of the earth system, and which will meet all the requirements of the sick chamber. The following advantages are claimed:

It is a comfortable chamber, easily supplied with earth, and its deposits are removed without trouble. It is portable, requiring no more room than an ordinary toilet pail. Instantaneous and perfect deodorization of its contents is secured, so that the atmosphere of the sick chamber may be kept much sweeter and purer than is usually possible, thus adding greatly to the comfort both of patient and attendant.

Patented, through the Scientific American Patent Agency, May 3, 1870, by W. H. Bliss, whom address for rights or closets, at Newport, R. I.

TO REPRODUCE A BEAUTIFUL WHITE ON FLANNEL GOODS TURNED YELLOW BY AGE.—For the restoration of old flannels to their original color, Prof. Artus tried a method that had been proposed formerly: 2¼ lbs. white Marseilles soap is dissolved in 75 lbs. of soft water, and to the solution is added, under constant stirring, 1 oz. of liquor ammonia. The goods are soaked in the fluid, and afterwards well washed with water. The object may be accomplished, however, quicker by putting the goods for an hour in a dilute solution of bisulphite of soda, and adding, under constant stirring again, some dilute hydrochloric acid, when the vessel has to be covered and the goods left in it for 15 minutes longer. They are then washed in the same way.

SAMUEL A. DUNCAN has been appointed Assistant Commissioner of Patents, and John M. Thatcher, of Virginia, Examiner-in-Chief in the Patent Office in the place of Mr Fessenden, resigned.

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To Advertisers.

The circulation of the SCIENTIFIC AMERICAN is from 25,000 to 30,000 copies per week larger than any other journal of the same class in the world. Indeed, there are but few papers whose weekly circulation equals that of the SCIENTIFIC AMERICAN, which establishes the fact now generally well known, that this journal is one of the very best advertising mediums in the country.

HOW THE HEIRS OF AN INVENTOR MAY BE REWARDED.

In the year 1819, Jethro Wood, then of Scipio, N. Y., took out a patent for a cast-iron plow, an implement now very generally used in this country.

Jethro Wood died in poverty after devoting his fortune and his life to the introduction of his improvement; and it may be said, with truth, that few men have conferred a greater benefit on mankind than he did by the invention and practical application of his improvement.

A bill has been recently reported in the House directing the Secretary of the Treasury to pay Phœbe and Sylvia Ann Wood, daughters of Jethro Wood, deceased, in trust for the heirs of said Jethro Wood, the sum of $25,000, out of any moneys in the Treasury not otherwise appropriated.

The report states that the Committee on Patents are satisfied, from the abundant testimony submitted to them, that Jethro Wood practically accomplished for the farmer what Fulton accomplished for the navigator; that like Fulton he died before it was possible for him, under the peculiar circumstances, to reap the reward to which he was entitled. He was the first man who invented and put into practical application and use the cast-iron plow. Singular as it may appear, before this invention the improvements in this much-needed implement were made at long intervals of time, and failed to result in any important benefit to mankind.

The report further states that until this invention was made the old-fashioned wooden plow was universally used in in this country, with its heavy wrought-iron share offering great resistance and requiring great power of draft. Jethro Wood improved the form of the mold board, constructed the several parts of cast iron, and in such manner that they could be speedily and strongly put together; made the plow far lighter of draft and easier to be guided, and not only reduced the original cost fifteen dollars a plow, but effected a great saving of time and expense which previously became necessary for constant repairs.

The report further states that additional particulars need not be cited, because every agriculturist is familiar with the details of this most useful invention; that it is sufficient to add that the Jethro Wood plow was finally adopted, and in its essential features is in universal use throughout our country. This result, however, was only effected after the struggle through which a meritorious inventor seems always fated to pass. When Jethro Wood made his first improvement, at which he labored many years of his life, until its perfection in 1819, he was known as a rich man, with a homestead of hundreds of acres and a comfortable income.

The great prejudice of the farmers against any innovation, the large expense of casting mold boards in many shapes until the desired one was obtained, the necessity of compensating incredulous manufacturers unwilling to assume what they call a great risk, soon deprived him not only of his fortune, but nearly all the profits of his new art which was then beginning to be appreciated.

Nor was this all. In order to convince it was necessary to a certain degree to give a public use to the article. It soon became pirated, and when suits were commenced the then defective state of our patent laws allowed the infringers to escape. In 1839 the law was at last altered so as to permit two years' use of an invention prior to the application for a patent without abandonment to the public; but even then Jethro Wood was met by decisions that this did not apply to patents issued before the passage of the act. It was not until 1845—several years after Jethro Wood had died in poverty, leaving a large family totally unprovided for—that on a full trial before Justice Nelson, of the Circuit Court at Albany, it was decided that the act of 1839 applied to patents granted before its passage; and all the questions of law and fact were determined in favor of the Jethro Wood invention.

Shortly after the patent expired, and on several occasions since, application was made to Congress for its extension in favor of the heirs, being two married and two single daughters of said Wood, and the child and grandchild of the two deceased sons.

In three Congresses as many reports were made upon these applications; and twice a bill passed the Senate granting the extension. But these bills failed in the House, because the farmers, while urging that a money relief should be given to the children of this public benefactor, were unwilling to pay it in the shape of a continued royalty.

The bill reported by the committee offers such relief to a very limited degree, taking into consideration the important progress in this art attained by Jethro Wood and the great benefits he conferred upon the public. But the sum of $25,000, which it gives, will alleviate at least the wants of his family, and show the gratitude of the nation to one whose useful invention has added comfort and wealth as well as honor to the people.

Previous to the passage of the bill, Mr. Randall, of Pennsylvania, raised a point of order for the purpose of inducing the Committee to reduce the amount. He regarded the claim as meritorious, but thought the sum named excessive. The judgment of the House, however, was expressed in favor of the recommendation of the Committee.

At the time the Goodyear heirs were applying for an act of Congress to enable them to secure another extension of the Vulcanized India-rubber Patent, we advised them to adopt the very course which has been so successful in behalf of the surviving children of Jethro Wood.

SYNOPSIS OF THE AMENDED PATENT LAW.

We have now before us a copy of the law to revise, consolidate, and amend the statutes relating to patents, recently enacted by Congress. It contains no radical changes, but simply codifies the old system, and reduces it into more compact shape. We do not consider it necessary to reprint the entire text of the bill, but will present a summary of its chief features.

The officers provided are a Commissioner, Assistant Commissioner, three Examiners-in-chief, Chief Clerk, Examiner-in-chief of interferences, twenty-two Principal Examiners, twenty-two Assistant Examiners, Librarian, Machinist, five clerks, class 4; six clerks, class 3; fifty clerks, class 2, forty-five clerks, class 1; and purchasing clerk.

Additional clerks, male and female, copyists, etc., *ad libitum*, or according to necessity

The claims and engravings to be no longer published in the report. The annual report to contain only a list of the patents.

The three Examiners-in-chief required to be persons of competent legal knowledge and scientific ability.

No other persons connected with the Patent Office required to have such qualifications.

Models to be furnished when required by the Commissioner.

The printing of the patents and drawings is authorized, and we trust that the Commissioner will make the work creditable to the advanced state of American art and invention

All persons may take patents provided the invention has not been in public use for more than two years.

No discrimination is made against Canadians. The law requiring foreigners to put their inventions on sale within eighteen months is abolished.

Assignments void, as against a subsequent purchaser, unless recorded within three months from date.

All cases can be appealed from the Commissioner to the District Court, except interference cases.

In cases where a patent is refused by the District Court, an appeal by bill in equity may be taken.

Disclaimers may be filed.

Designs may be taken by all persons—no discriminations. This will enable foreign manufacturers to protect themselves against having their designs copied, which has hitherto been quite extensively practiced in this country, especially in the production of textile goods.

Trade-marks may also be protected by firms or individuals, $25 for thirty years, with right of renewal.

The above are the more important changes made by the new law. They are simple, and on the whole commendable.

EXPERIMENTS WITH GUN COTTON.

In consequence of several serious accidents by the explosion of nitro-glycerin, many transportation companies have become very suspicious of all explosive agents, and frequently decline to take gun cotton as freight, although all precautions are observed that are usual with gunpowder. In order to quiet the fears of the freight agents, some experiments were undertaken by Messrs. Wilson & Prentice that are worthy of notice.

A small box, containing 125 charges of gun cotton, representing an explosive force equal to one quarter of a tun of gunpowder, was fired by a fuse in an open space. As soon as the fire reached the cotton, there was a great flame, similar to that produced by straw, but no explosion, and, after the lapse of a few moments, nothing further was burning excepting the brown paper in which the gun cotton had been packed. The box was an ordinary one, such as is commonly used for the transportation of gun cotton, was fastened by nails, but not by iron bands on the covers.

Several charges of gun cotton were placed on the track and were run over by heavy coal cars; some of them were ignited, others not. Another charge was cut into pieces by a chisel without producing any effect—there was neither explosion nor ignition. By percussion on an anvil, a roll of gun cotton was exploded, but it was observed—as is the case with nitro-glycerin, under similar circumstances—that only the portions struck gave an explosion; the other portions burned up quietly.

The heat of burning gun cotton does not appear to be very great, as a small tuft of it can be fired on a heap of gunpowder without igniting the powder.

In reference to the spontaneous decomposition of gun cotton, there is no well authenticated instance of such a change taking place without elimination of fire; but numerous examples of the entire disappearance of the contents of bottles and boxes are on record. Sometimes the cotton changes to a gum, and, at others, to oxalic acid; but the chemical decomposition takes place gradually and without danger.

From all of these observations, it would appear that gun cotton can be transported as freely as gunpowder and with the same precautions. In Germany, in order to satisfy the minds of the freight agents, gun cotton for philosophic purposes, is sent in bottles, wet with alcohol, and, on arrival at its destination, only requires to be saturated with ether to be dissolved into collodion, ready for use. Gun cotton is also sometimes immersed in a bath of melted paraffine, to protect it from the effects of moisture.

THE MANUFACTURE OF BEET-ROOT SUGAR IN ENGLAND.

The manufacture of beet-root sugar in countries where beets can be grown, and which now depend for their supplies of sugar upon other countries, seems to be attracting general attention at the present time.

In America this manufacture has been already commenced, and is giving promise of future success. In England this industry has been considered as offering superior advantages as a means of relieving the condition of the working classes now suffering under the existing industrial depression in that country. The art of extracting sugar from the beet is, however, so imperfectly understood outside of the countries in which it is extensively practiced, that the quickest way to convince agriculturists and capitalists that large profits are possible from its introduction into countries where beet-root sugar is not at present made, is by publishing as widely as possible the details of processes, their scientific basis, and full statements of cost of plant, current expenses, and the returns which may be relied upon for a given expenditure.

All this information is comprised in the work under review*, together with much other matter of great value to all, whether English or American, who directly or indirectly feel an interest in the extension of beet-root sugar production.

The origin of the work is stated in the following extract from the author's preface:

The present volume is founded principally upon a series of articles published about twelve months ago in the columns of the SCIENTIFIC AMERICAN, a weekly newspaper, which, in its special department of applied science, stands almost without a rival on the American continent. The articles were written by M. Julien M. Deby, C. E., a scientific gentleman who has devoted considerable time to the practical study of this manufacture on the Continent of Europe; and arrangements were made with the proprietors of the SCIENTIFIC AMERICAN for their republication in England, with the original illustrations, it being intended to reproduce them, almost as they stood, in the pages of the *Chemical News*. The subject, however, appeared to be of such national importance, that it was soon decided to issue the articles in the form of a book, with such alterations and additions as were necessary to bring the information down to the latest date, and adapt it to the requirements of the United Kingdom. The following pages must therefore be regarded as an original work, Mr. Deby's articles having been closely followed only in Chapters III., V., VI., VII. (the latter part), and VIII.

A further extract will show the great benefits which would undoubtedly result to England from the introduction of the beet-root sugar industry into England:

The Chancellor of the Exchequer, in his recent speech on the Budget, when introducing the subject of the partial remission of the sugar duties, said: "We know that the beet root industry of the Continent seems to have got over its difficulties, and to be spreading very widely. There is also the prospect of the growth of beet root, with this object, in our own country; and if we could hope for anything so good as that it should be introduced with success into the south of Ireland, it would be one of the greatest blessings that could possibly befall that country."

The sugar beet has been grown experimentally in various parts of the county of Kilkenny by the Hon. L. Agar Ellis, M.P., and the important result has been established that the climate of the south-east of Ireland is suitable for the growth of such a crop, and that sugar beet can there be grown of a quality which will remunerate the manufacturer. It is calculated that a proportion of 8·5 of crystallizable sugar will pay, and in some instances comprised within the range of the experiments there was a yield of 10·91 and of 8·94. Mr. Ellis observes that, to make the crop worth growing, either the present sugar refiners of Ireland must put up machinery for "converting" it, or separate districts must erect the necessary works. That the magnitude of the industry is sufficient to warrant operations on the largest scale, is shown by the fact that last year France alone produced no less than

* ON THE MANUFACTURE OF BEET-ROOT SUGAR IN ENGLAND AND IRELAND. By William Crookes, F.R.S., etc., Editor of the *Chemical News*, Illustrated with Ten Engravings. London: Longmans, Green & Co.

300,000 tuns of beet sugar, which at £25 per tun would be worth £7,500,000, the molasses (100,000 tuns at £5) bringing up the value to £8,000,000. Beet root may yet redress the injury inflicted on Ireland by the potato.

Perhaps no English chemist possesses superior qualifications for the preparation of such a work than Dr. Crookes. His ability as a chemical writer and experience as an editor have placed his journal, the *Chemical News*, at the head of all similar publications printed in the English language, while it is equal in reliability, comprehensiveness, and in all other respects to any journal of its kind published in the world.

The book is not, however, valuable on account of the extent of original matter contributed to its pages by the author, but as a specimen of able and discriminating compilation; and in its freedom from superfluities or omissions, it is excelled by few technical treatises.

An introduction gives an account of the discovery of sugar in beet roots by Marggraf, in 1747, and a recital of the difficulties he met with in his attempts to establish its manufacture. This is followed by a brief history of the rise and progress of the industry, and a survey of its present extent. The introduction is followed by a chapter upon the beet, its nature, composition, average yield, and percentage of sugar it contains in various localities.

Chapter II. gives full direction for the cultivation of the beet in all its stages of growth, and also methods for harvesting and preservation of the crop. In this chapter will be found much additional matter to that originally furnished by Professor Deby for our columns; the views of Dr. Voelcker, an extensive contributor to the "Journal of the Royal Agricultural Society," on the "Chemistry of the Silesian Sugar Beet," and "Beet-Root Pulp," and also those of Mr. Arnold Baruchson, who has published a valuable work upon Beet-Root Sugar*, being given.

The chapters referred to in our extract from the author's preface, contain the principal part of the technical information contained in the work, so far as it pertains to the manufacture of sugar from beet roots, substantially the same as published originally in Vol. XX. of the SCIENTIFIC AMERICAN. But the ten other chapters contain very full information upon very important matters. The chemistry of beet-root sugar is much more fully treated in the fourth chapter than was done by Mr. Deby. From the ninth to the fifteenth chapter inclusive, the work treats of what is known as the new "concreting process;" the utilization of the spent-root beet pulp; the manufacture of spirit from beet juice; the new sucrate of lime process, which seems likely to prove of great importance; the manufacture of potash salts from the beet residues; excise regulations; percentage of sugar in different kinds of beets; yield per acre; and a full description of Dr. Schiebler's calcimeter, or apparatus for the quantitative estimation of the carbonate of lime in bone-black, by volumetrical assay.

An appendix contains useful tables of comparison of the degrees of Baume's areometer or hydrometer, with the specific gravities of liquids.

The work is a handsome octavo, printed on tinted paper, and tastefully bound. It should be in every technical library, and should meet with a large sale in this country, as much of the matter it contains has hitherto been inaccessible to the majority of American readers.

* BEET-ROOT SUGAR: Remarks upon the Advantages derived from its Growth and Manufacture in the United Kingdom, together with a Description of its Rise, Progress, and Present p sition on the Continent of Europe, and some Practical Directions to Agriculturists and Manufacturers, with an Appendix on the "International Covention." By Arnold Baruchson. London: Effingham Wilson, Royal Exchange. 1868.

PAPER AND PAPER STOCK.

The Industrial Society of Mulhausen, France, recently offered a reward for the best treatise on the manufacture of paper and the choice of stock. The award was made to M. Oriolli, from whose admirable dissertation we propose to prepare a few abstracts.

The author first gives a scientific exposition of the properties of cellulose, then discusses the best methods for its treatment, and, finally, gives an account of all the raw material from which paper can be made.

It is gratifying to see that in the manufacture of paper, as well as in all other arts, there has been great progress during the last hundred years. Chemistry and mechanics have each contributed their part. The former has afforded us improved methods for washing, bleaching, bluing, and coloring the stock, which must yield a different product from what was made by the ancients. The mechanical improvements have been many, and tend to facilitate and cheapen the manufacture of paper. The use of ultramarine, which at one time was almost as valuable as gold dust, is a contribution from chemistry that the most sanguine believer in the progress of science could not have foretold. To see the beautiful blue color that Raphael so highly prized now made so cheaply as to be available in every laundry and in extensive manufactures, is one of the triumphs of modern science.

The same science that has given us our color has also taught us that the cellulose of all plants is the same as that contained in rags; and, in fact, the fiber of some plants will give us a paper that cannot be made from rags.

Not all plants, however, are adapted to the making of paper. Much depends upon the bark, membrane, and fiber, and there is a difference in the purity of the cellulose in various plants. The chemical tests also show a modification in the fiber of plants. The cellulose of cotton yields a blue color immediately with tincture of iodine; that of flax does not turn blue until an acid has been added, and hemp requires both acid and considerable time before the blue color makes its appearance. These reactions point to the presence and absence of starch and glucose in different species of plants Chemically pure cellulose is perfectly white, more or less translucent, elastic, with a mean specific gravity of 1·5. It is insoluble in water, alcohol, ether, and volatile and fixed oils. It is unchangeable in dry air, but when moist, it becomes yellow in consequence of the formation of ulmic acid. In the sunlight moist cellulose suffers changes that have not been fully explained, and these alterations are modified and retarded by coloring or any organic matter. The action of acids upon cellulose is full of interest. Sulphuric acid changes it into a species of parchment, and if the action of the acid be permitted to go on for some time, the cellulose is transformed into starch, dextrine, and glucose. Very concentrated sulphuric acid chars paper and converts it into ulmic acid. Nitric acid has violent action upon cellulose and changes it into explosive compounds, and longer contact converts it into oxalic acid. Hydrochloric acid dissolves cellulose in small quantities.

A mixture composed of 80 per cent hydrochloric acid and 20 per cent nitric acid has been shown, after a great number of experiments, to be the best adapted for the disintegration of woody fiber. In 24 hours it converts the cellulose of wood into a spongy, soft mass, that can be easily separated by the fingers. The color is not changed, and all of the incrusting and foreign matter of the wood is destroyed.

In consequence of these experiments, Oriolli came to the conclusion that woody fiber treated as above, afterwards carefully washed, pressed in a mortar, again washed, neutralized with a 10 per cent soda lye, bleached with a 10 per cent chloride of lime bath, would yield long, soft, strong, silky fiber for the manufacture of paper. But notwithstanding the success of the experiment in a small way, all attempts to apply it on a large scale have proved unsuccessful. The wood was mixed with the *aqua regia* in large stone reservoirs, and it was found to be impossible to prevent leakage; then arose the difficulty with the red fumes of nitrous acid that produced a most deleterious effect upon the workmen. After the wood is disintegrated it must be hastily washed or the acid would wholly destroy it, and there was difficulty in performing this operation, as the acid would attack iron rapidly, and thus introduce chloride of iron into the stock, which would certainly ruin it for the manufacture of paper. There was also a great loss of soda growing out of the neutralization of the pulp after it had been disintegrated.

The inventors found so many difficulties that they were obliged to abandon the process, but it nevertheless possesses many points of interest, and may suggest a way of treatment for other fibers that have thus far not been found available for the manufacture of paper.

It is somewhat remarkable that Oriolli insists upon the necessity of some kind of treatment, by acids or alkalies, of the woody fiber before it can be adapted to the manufacture of paper, and yet in the face of his theory we have in the United States vast quantities of wood paper made without bleaching and by simply washing the pulp which is rasped from the sticks by rapidly revolving wheels.

In this country the whole process is a purely mechanical one, excepting in the establishment near Philadelphia, where chemical agents are employed.

Oriolli prefers boilers with double bottoms to any other invention for preparing the stock, and he lays much stress upon the gradual increase and decrease of the temperature. He also gives an account of the successful employment of ammonia water in the treatment of certain kinds of fiber. In reference to the various ways of bleaching the pulp preference is given to the employment of chlorine gas and of hypochlorites. If the hypochlorite of alumina were a salt that could be made in sufficient quantity and at a reasonable cost, it would be better than any other as a bleaching agent, but under the circumstances its use must now be confined to a superior quality of paper where the cost is of less importance. Bleaching by chloride of lime appears to have been universally adopted, although of late years much has been said about the use of permanganic acid as in every way preferable.

As for the vegetable fiber best adapted to the manufacture of paper, nearly everything has been tried—roots, leaves, stems, bark, cabbage, potatoes, beets, vines—but in practice none of them has been found of any value. On the other hand straw, wood, corn stalks, rice straw, esparto grass have been successfully used in various countries.

Interesting and valuable articles could be written upon each of the last enumerated raw material now used in the manufacture of paper. In Austria the husks of corn are not only made into paper but into clothing, and a good article of food is also produced from them. Paper clothing is also made in China and Japan, where a good coat can be had for ten cents, and a suit of clothing for a quarter of a dollar. In Germany paper napkins are now introduced, the cost of them is a trifle, and they can, after having been once used, be thrown into the common stock to be worked over again.

The fact that cotton and linen are really the same thing, chemically speaking, as paper, may take away from the prejudice that some persons entertain in reference to the use of paper collars, cuffs, and clothing. The cheap production of paper suggests its application for many ornamental and useful purposes. For doors, windows, cornices, papier-mache statues, moldings, bookbinding, pails, tubs, boats, and houses, there is a great future open to paper, and hence the importance of increasing our stock of raw material and our knowledge of the best methods for its manufacture.

ARTIFICIAL ULTRAMARINE.

Ultramarine, as known to the ancients, was called *lapis lazuli*, and was a precious stone. Very fine specimens of the mineral were ground up and used by the old masters, Raphael, Guido, and Domenichino, for the choice paintings, but the color was as dear as it was highly prized.

A few years ago a German chemist, while experimenting with anhydrous sulphuric acid and sulphur, made the accidental discovery that an exquisite blue color was produced. He came to the conclusion that the blue color of the ultramarine was probably due to sulphur and sulphuric acid, and at once instituted some experiments with alumina, soda, sulphur, and sulphuric acid, and succeeded, after repeated failures, in actually imitating the precious stone. It is not necessary to follow out the history, but is more agreeable to refer to the great success attending this industry at the present time.

Ultramarine is now so cheaply made that it enters into more industries than the public are aware of. We find it in the laundry as a bluing to correct the yellow color of linen. In the manufacture of white paper the consumption is becoming enormous. It finds ready application for fancy paper, paper hangings, and window shades, and is largely used in painting, not only decorations, but the common wood work of our houses. In the refinery of sugar it is also employed to give a fine white color to the loaf.

Its cheapness and the abundance of the supply have suggested its application in all cases where a clarifying substance is desired, and its manufacture has now reached proportions of many tuns per annum. We can buy a box of bluing for twenty-five cents that would have cost Raphael some thousands of dollars. Such is the success of the application of chemistry to the arts; and it is a color of so much importance in many manufactures that its cheap preparation has become a matter of prime necessity, and numerous establishments now vie with each other in producing a choice and cheap article. The principal seat of the industry is in the neighborhood of Nuremberg, where the original discovery of its artificial production was made.

PROJECTED SHIP CANALS.

The great Suez Canal, and the proposed Darien Canal, have so occupied the attention of the public that few have had their attention called to the numerous projects of a similar character now on foot in various parts of the world. It would seem that nations are everywhere looking for new and shorter routes of commerce, and that an era of ship canals has commenced.

In a recent issue we announced that the Suez Canal had been deepened so as now to admit the passage of vessels of the largest class. This was doubted by a cotemporary journal which is supposed to know more about spiritual than engineering matters. The fact remains, however, and sufficiently substantiates our statement, that large cotton steamers, one of them carrying over eleven thousand bales, have recently made the passage, one of them passing through the canal in only fourteen hours, and this passage has justly been accepted as establishing the practicability of the canal for larger vessels.

The prospects of the Darien Canal are not definitely settled, but it is hoped a practicable route will be established ere long.

The canal that was proposed to be established between the Baltic Sea and the German Ocean is now much favored by various commercial associations, and is so strongly urged that probably a survey to establish the most practicable route will soon be made.

It is thought that a canal will also soon be cut through the Isthmus of Corinth in Greece, thus connecting the Gulf of Ægina and Lepanto. This canal cannot, however, compare in extent or in commercial importance with the one intended to connect the Baltic with the German Ocean. It is, however, favored by the Greek Government, and will probably be cut through sooner or later.

A much more important project, and one which in magnitude eclipses all the others is a canal connecting the Bay of Biscay with the Gulf of Lyons, a distance of two hundred and twenty-five miles. An estimate of the cost of the work has been placed at $125,000,000. The termini of this work as now projected are Bordeaux on the Bay of Biscay, and Cette on the Gulf of Lyons. The section of the cutting is proposed to be of the same dimensions as the Suez Canal.

Other minor works of the kind are under consideration, and it is quite evident that the isthmuses of the world are destined to become the scenes of remarkable engineering works in the time to come.

The commercial changes the works already projected will effect, if they should ever be completed, are altogether beyond present comprehension. A work like that proposed between the Bay of Biscay and the Gulf of Lyons, could scarcely have been looked upon, in any other age, except with doubt and derision. If any now deride, it is because they see reason to doubt financial, rather than engineering success.

FRICTION MATCHES.

Matches without phosphorus or other poisonous ingredient are made by J. J. Karlen & Sons, of Erlenbach, Switzerland, in the following manner:

To a solution of bichromate of potash dissolved in cold water is added hyposulphite of lead, then chlorate of potash, then sulphur, then peroxide of manganese, and finally peroxide of lead, in the order stated.

These six materials are well mixed and kneaded together with water to form a thick paste, which is then rubbed upon a slab or passed through a mill, such as is used for grinding paints, so that all the ingredients are intimately and thoroughly blended. The paste is then warmed in a bath of lukewarm water, but not hot water.

Gelatin or glue having been dissolved in somewhat warmer water, this solution and powdered glass are added to the former mixture, and the whole mingled together in the form of a paste, which is then well stirred for a quarter of an hour, when the composition is ready for dipping the match sticks.

It is important that the chlorate of potassa be ground to

an impalpable powder. The glass should not be so finely pounded.

These matches ignite readily by friction on a common match-box or any suitable rubbing surface, as stone, glass, porcelain, wood, etc.

The above invention was patented in the United States April 5th, 1870. For further information, address John Hitz, Esq., Consul-General of Switzerland, Washington, D. C.

REPORT OF THE DEPARTMENT OF AGRICULTURE FOR MAY AND JUNE.

The season has sufficiently advanced to render practicable the formation of an approximate opinion as to the prospects of the coming harvest.

Those engaged in strictly mechanical pursuits are apt to overlook the intimate relation existing between general agricultural prosperity and that of the manufacturing interests. The cotton or woolen manufacturer directs his attention principally to the production of the staple which he consumes in his business, and is apt to feel too little interest in the production of food crops, notwithstanding the fact that scarcity or fulness in any particular production unavoidably influences prices, and even the future production of other staples. A scarcity and consequent sustained high prices of beef may induce the wool grower to abandon his present business and seek for a larger profit in the growth of neat stock. Or, the profit which is found in the growing of cotton may so induce an increase of cultivation as to greatly affect its price.

As we have said, the season is sufficiently advanced to enable some judgment to be formed upon matters of this kind, and the Commissioner of Agriculture has given in his last report statistics and facts, which are of interest and value in making up an opinion as to the probable future of the manufacturing and commercial interests as affected by the next general harvest.

The average heat of the present season has been greater by a difference of from six to seven degrees than for the corresponding months of 1869, and very large sections of country have felt a serious deficiency in the amount of rainfall. The parts of the country which have suffered most in this respect are the New England States, portions of New York, an extensive section between the Ohio River and the northern lakes running as far west as Lake Michigan; another section west of the Mississippi, and south of Iowa, and the cotton States from South Carolina to Louisiana.

While a decrease of five per cent in the acreage of wheat sown is reported, compared with last year, the Eastern and Southern wheat-growing States report the crop as above an average. Per contra, the leading Western wheat-growing States report unfavorably, so that, on the whole, there will probably be a smaller crop of this cereal than was produced last year. In Utah the grasshoppers have made great havoc in the wheat fields, and in California the squirrels are said to have been destroying the crop "by the acre daily." The ravage caused by these animals has been so great that public meetings have been called to organize some method of protection from their depredations. The other cereals will probably be a fair average production.

In regard to cotton, the report says:

The cotton growers seem determined this year to reduce the price to fifteen cents, with every prospect of doing it. The acreage is materially increased in every State, while that of wheat (and probably of corn, though the county estimates of the entire country do not come in till July 1) has decreased. If neglect of all other interests can only be cured by cheap cotton, the sooner the reduction comes the better. The condition of the growing crop in North Carolina is good; in South Carolina it is looking well, except that some complaint of bad stands is made; in Georgia it is late, and smaller than usual from effects of a drought of five weeks, which terminated May 25, but is growing vigorously now; the dry term was shorter in Florida and Alabama, and cotton is generally in good condition. Reports from Mississippi are still more favorable; in Tensas Parish, La., where the greatest cotton yield of 1869 was made, the condition of the crop is 20 per cent better than last year, and the acerage is increased one fifth; from Texas comes reports of a backward spring, with cotton late but thrifty and promising; and no State makes more favorable returns than Arkansas.

The average condition of cotton is better than last year at this time—a fact desirable and gratifying in itself, but of no controlling force in determining the ultimate result. Last season was unpropitious to August, and afterward favorable to an almost unexampled degree, a tenth of the crop being due to the extreme length and propitious character of the autumnal season. The acreage of Sea-island cotton in Texas has been increased.

The autumnal fruit crops give great promise of abundance.

The beet sugar works at Alvarado, Cal., are nearly completed. When in full operation they will be able to crush fifty tuns of beets per day. The beets grown in that State are rich in sugar, an analysis showing a yield of ten per cent, or two per cent better than the average yield in Germany and Belgium.

The Commissioner alludes to the competitive trials of harvesting machinery to be held in Missouri and Ohio during the coming harvest. In Missouri the trial will be made of harvesting machinery in general; reapers, mowers, horse hay forks, hay stackers, hay rakes, and all kinds of machinery germane to harvesting, to be held near St. Louis during the harvest of 1870. The trial will be conducted under the immediate supervision of the State Board of Agriculture, some of the members of which will serve on each of the awarding committees. The trial will be conducted, in the main, under the rules of the reaper trial, held at Dixon, Ill., which were also adopted at the last World's Fair, held in France; namely—1. Quality of work, representing perfection, 40. 2. Simplicity of construction, representing perfection, 10. 3. Durability of construction, representing perfection, 15. 4. Ease of draft, representing perfection, 20. 5. Market price, 5. 6. Facility of management, 10. A perfect machine (reaper or mower), 100. Entry fees of $5 to $10 will be charged for machines.

The award will be the certificate of the Missouri State Board of Agriculture, and that to be the first and only reward.

The Ohio trial will be held at Mansfield, in that State, and will be conducted by the Ohio State Board of Agriculture. It will be confined to mowers and reapers, and will commence at such time as wheat may be in proper condition to test the machines, and continue from day to day until all machines are satisfactorily tried. The scale of merits, as agreed upon by the committee is the same as that adopted for the Missouri trial. The first prize will be a gold medal for the best reaping machine; the second, a gold medal for the best mowing machine; the third, a gold medal for the best reaping and mowing machine.

SCIENTIFIC INTELLIGENCE.

COBALT BRONZE.

A fine violet bronze, which can be rubbed up like talc, and resembles chloride of chromium, can be prepared from cobalt. It is free from arsenic, which is of material importance, and is chiefly composed of phosphoric acid, oxide of cobalt, ammonia, and water. A green cobalt color is made of oxide of cobalt and oxide of zinc. If these colors could be made in sufficient quantity, and cheaply, they could in many instances replace the poisonous arsenic colors now extensively employed for wall paper.

TUNGSTEN COMPOUNDS.

Notwithstanding all the efforts that have been made to introduce them, tungsten colors do not appear to find much favor—nor does the use of tungsten in the manufacture of steel accomplish all that was predicted for it. The goodness of the steel was generally found to be due to the manganese that happened to be present in the tungsten ore. Tungstate of zinc has been proposed as a substitute for white lead; and tungstate of soda is sold as a phœnix powder because it renders fabrics incombustible. This latter use of tungsten compounds to prevent the combustion of theatrical scenery and of dresses is one of the most important of any.

CURE FOR WARTS.

The best cautery for warts, corns, etc, is said to be dichloracetic acid. It must be applied on the sharp point of a glass stopper made for the purpose, and great caution ought to be observed not to use too much of it, as it will eat a deep hole into the flesh. One application is frequently sufficient to drive away a wart. The acid smells like vinegar, but is a much more powerful caustic. It can be had of our best druggists, and sometimes comes put up in bottles with directions for use.

THE RIGHT OF APPEAL MAINTAINED.

The original bill before Congress to amend our patent system, withheld the right of appeal from the decision of the Commissiener of Patents. This proposition was discussed and opposed in the SCIENTIFIC AMERICAN of Feb. 19, the article concluding as follows: "Hence we contend that the right of appeal from the Commissioner's decision should be sacredly preserved, and with such additional safeguards thrown around it as will reassure inventors that they have an impartial, inexpensive tribunal outside the Patent Office, to which they can apply for redress." Applicants for patents will be gratified to learn that the right of appeal (except in interfering cases) to the Supreme Court of the District of Columbia is retained—a feature in the law that we consider of great value.

AMERICAN INSTITUTE EXPOSITION.

During the months of September and October next, our readers will find at the great structure on Third avenue, near Sixty-third street, the grand annual display of the products of American skilled labor. Arrangements have been completed by which the Directors will have this year, what on previous years they have so much needed, room enough. This industrial display will be a leading feature in the attractions of the metropolis even to the common visitor, and may well draw artisans and all of a scientific taste from distant localities. It is time for those intending to enter machines and goods to apply for space. See Secretary's card in another column.

Fair of the Cotton States Mechanics and Agricultural Fair Association.

The First Annual Fair of the above Association will be held at Augusta, Ga., commencing on Tuesday, Oct. 25th, and continuing five days. The managers feel confident that exhibitors of all branches of industry from the North as well as from the South, will find no better opportunity for bringing their productions prominently before the public, than will be afforded at this exhibition. They assure exhibitors of articles which, under the rules of the Association, may be debarred from competing for premiums, that every facility shall be afforded them for displaying their productions to the best possible advantage, and that committees will make ample arrangements for the accommodation of visitors and exhibitors during their stay in the city. Mr. E. H. Gray, of Augusta, Ga., is the Secretary of the Association.

AT a distance of 1800 feet above the surface of the earth the air is expanded to double its original volume, and, as a consequence, the pressure is diminished to half its original amount.

The Good and the Evil of Much Knowledge.

A writer in *Fraser's Magazine*, taking for his text the words of Solomon: "He that increaseth knowledge increaseth sorrow," shows clearly enough that knowledge is not an exception to the rule, that no sublunary attainment, no matter how free it may be from sin, either in its procurement or enjoyment, is altogether an unmixed good, and that knowledge, in all departments, has increased sorrow; but he does not leave the subject without presenting the reverse of the picture, and this reverse we lay before our readers. As a specimen of powerful rhetoric we have seldom met its superior. He asks:

Is, then, the pursuit of knowledge, after all, truly a delusion, the worst and weariest of human mistakes, a thing to which we are driven by our necessities on one hand, and lured to by our thirst for it on the other, but which, nevertheless, like the martyr's cup of salt water, only burns our hearts with its bitter brine?

No! no! a thousand times, no! The mistake has not been in the pursuit of knowledge, but in the reasons we have alleged for that pursuit. We have wooed our beautiful bride for her dower, and not for her own sake, and it is but justice if we discover that that dower, amid its treasures, contains many a snake.

Man *was* created "to know and to contemplate. The *differentia* between him and the lower animals has been stated in many ways; but the most real of all differences is, that he bequeaths from generation to generation (mainly, of course, through written language) his experience and his faith; so that the "heir of all the ages" is the recipient of the whole treasure of time. Each dog is an upstart, a self-made creature. Each man has royal pedigree, and all the sages of the world are his preceptors. His thoughts grow on the grafts of culture. His religious trust is no solitary spring of enthusiasm, starting up alone in the desert; but the flowing stream into whose higher waters all the prophets and apostles have emptied their urns.

This is the true distinction of humanity. All others are matters of degree; degree of cranial development, degree of higher osteological type, degree of faculties of all kinds. One philosopher will say, "man alone is a laughing animal." But the bark of a dog, in its delight of freedom, is the joy-laughter of a child.

Another remarks that man alone is a "cooking animal." But, having no hands, the beasts can light no fires, and all which is physically possible they actually effect by burying their food till the four-footed epicure can eat it "high."

Again, a third says that "man alone can speak." But some animals have almost as many sounds as they have wants and ideas, and unlettered savages have little more. It is not till language comes to be written that the analogy stops.

A fourth observes, that man alone has the sentiment of pity. But cannibals kill and eat their dying relatives, just as the *carnivora* do; and an affectionate dog has an amount of sympathetic compassion for his master's tears which it is much to be wished his fellow-man should invariably feel.

The fifth claims the sense of right and wrong as the sole prerogative of humanity. But, at least, so far as extends the system which rests morality on rewards and punishments, even the heavy-witted cow has a clear idea that she is doing unlawfully in getting through the hedge into the corn.

Even the sixth grand distinction between man and beast—the religious sentiment—is rather in the object of the feeling than in the nature of it. The Creator has, as it has been often said, made man a god to the beasts. The devotion, humility, fidelity, gratitude, allegiance of a noble dog to a kind master, if not religion itself, is a perfect parable of religion. Fain would we hope that feelings so beautiful—we had well-nigh said, so sacred—must possess immortality, even in the poor fond brute. Is heaven to be a world without any life in it except our own? As well might we suppose it without flowers!

Knowledge, like virtue, is not good because it is useful, but useful because it is good. It is useful contingently, and good essentially. The joy of it is simple; and not only needs not to be supplemented by accessory advantages, but is well worth the forfeit of many advantages to obtain. The most miserable wretch we can imagine is the ignorant convict locked up in a solitary cell, with nothing to employ his thoughts but unattainable vice and frustrated crime, whereon his stupid judges leave him to ruminate, as if such poison were moral medicine, likely to cure the diseases of his soul. And, on the other hand, one of the happiest beings we can imagine, is the man at the opposite end of the intellectual scale, who lives in the free acquirement of noble knowledge. What is any "increase of sorrow" incurred thereby, compared to the joy of it? To look on the fields of earth and air—not as the dull boor regards them, as mere patches of brown, and green, and blue, with promises of food or shelter, sunshine or shower—but as the geologist, the botanist, the astronomer, regards them, each as an infinite world of interest, wherein order, and law, and Beauty are tracked by his rapid thought, even as the swallow traces the insect on the wing! To be able to take surveys such as these, is to be admitted to a spectacle for which angels might envy the sons of men. But to do yet more, to make memory like a gallery hung round with all the loveliest scenes of nature, and all the masterpieces of art; to make the divine chorus of the poets sing for us their choicest strains, whenever we beckon them from the cells where they lie hidden deep in our souls; to talk familiarly, as if they were our living friends, with the best and wisest men who have ever lived on earth, and link our arms in theirs in the never-withering groves of an eternal Academe,—this is to be happy, indeed. This is to burst the bonds of space and bring the ages together and lift ourselves out of the sordid dust to sit at the banquet of heroes and of gods.

Is "the increase of knowledge the increase of sorrow?"

Ay, so let it be, wise son of David! But, not its own sorrow, nor all the other sorrows of earth, can dim its triumphant and inalienable joy.

Experiments in Wood Pavements.

The Boston *Herald* says: "The laying down of wood pavements in Columbus avenue, in that city, by way of experiment, and for which the City Council appropriated $100,000, to test the various kinds, side by side, is now in progress. The proposed experiment was to give about half a mile in space, or 2,700 feet, assigning to each of nine varieties 300 feet. But seven of the owners of wood pavement patents have availed themselves of the opportunities for making the test, and the space assigned will extend from Clarendon street south, to a point between West Newton and Rutland streets. The occupied space is nearly 13,000 yards, the price ranging from $3·25 to $5 per yard, and the contracts amounting to about $50,000. The pavements represented, and their order, from Clarendon street, are: the Paul, Warner, Lancaster, Hodgman & Perkins, Stafford, Nicolson and Betterley. The Miller and Stowe, the most southerly, do not make their appearance. The Paul pavement is nearly completed. This is the same now on trial in Tremont street, from Pleasant street to the railroad bridge, the price being $4 per yard. The Warner has been commenced, adjoining the Paul, and is composed of square blocks of burnetized spruce, the price being $3·50 per yard. The third section, the Lancaster, is a partially hollow block, a smaller block fitting into this, with a filling of concrete, the price being also $3·50 per yard. The Hodgman & Perkins blocks fit together at the bottom, smaller at the top, with wedge-shaped interstices, to be filled with a concrete substance. This also is to be furnished at 3·50 per yard. The Stafford pavement is the same now in use around the Court House, the price being $5 per yard. The Nicolson was several years tried in Exchange and Mason streets, and is put down at $4. The Betteley is composed of round blocks of chestnut, and is to cost $3·25 per yard."

Blood.

By the aid of a microscope it is seen that blood consists of minute round bodies floating in an opaline liquid; these are termed corpuscules. They are so very small that one cubic inch of blood contains no less than eight hundred million corpuscules. Blood is rather heavier than water, as is seen when a drop is let fall into the transparent liquid; it falls through it. In about fifteen minutes after blood is drawn from the body it ceases to be fluid, and becomes a gelatinous mass. After standing for about twenty-four hours it separates into two distinct parts—one a watery fluid, which is called serum; the other, a solidified mass, coagulum. The red color of blood is due to a substance called hematine, which exists in the corpuscules. The coagulum consists in the main of a body called fibrin—flesh producer—masked by the color of the hematine. This fibrin differs but little from the nature of the white of egg. The blood fulfils every office in the body by restoring and building it up. Certain matters are eliminated from the blood to produce hair, nails, skin, fat, muscle, bone, brain, etc. It is therefore obvious that the blood must be of a complex nature. As a single fluid it contains more known elements than any other known natural body; among others may be mentioned phosphorus, lime, magnesia, iron, sulphur, soda, chlorine, potass, etc. In its natural condition it contains fat and sugar. The average composition of blood indicates that in every thousand parts from a male, it contains 780 of water; from a female, 790 of water.—*Septimus Piesse.*

DEATH OF ADMIRAL DAHLGREN.—We regret to be called upon to chronicle the death of Admiral Dahlgren, an officer of high distinction, and the inventor of the celebrated gun which bears his name. He was a man of liberal attainments in his profession, and an accomplished military engineer. An able officer, he merited by courage and genius all the honors which he won.

S. MEUNIER states that it appears more and more certain that the cutting down of forests in France is rapidly decreasing the annual rainfall.

Facts for the Ladies.

I have had a Wheeler & Wilson Sewing Machine over twelve years; have never spent a shilling for repairs; have done the sewing for a family of four all that time, and for the last two years done all my sewing with the same needle; and do not know any reason why it should not last for several years to come. MRS. ANNETTE GERYER.

Rock Island, Ill.

APPLICATIONS FOR THE EXTENSION OF PATENTS.

APPARATUS FOR GENERATING CARBONIC ACID.—J. F. Boynton, Syracuse, N.Y., has petitioned for the extension of the above patent. Day of hearing Sept. 21, 1870.

PLATE-HOLDER FOR PHOTOGRAPHIC CAMERAS.—William Lewis, of Brooklyn, N. Y., and William H. Lewis, New York city, have petitioned for an extension of the above patent. Day of hearing Sept. 21, 1870.

VISE.—Caleb C. Walworth, Boston, Mass., has petitioned for an extension of the above patent. Day of hearing Sept. 21, 1870.

MACHINE FOR MAKING NUTS.—William E. Ward, Portchester, N. Y., has applied for an extension of the above patent. Day of hearing Sept. 21, 1870.

METHOD OF BENDING WOOD.—Edwin Kilburn, St. Louis, Mo., Artemas Kilburn, and Cheney Kilburn, Philadelphia, Pa., have petitioned for an extension of the above patent. Day of hearing Sept. 21, 1870.

Inventions Examined at the Patent Office.—Inventors can have a careful search made at the Patent Office into the novelty of their inventions, and receive a report in writing as to the probable success of the application. Send sketch and description by mail, inclosing fee of $5. Address MUNN & CO., 37 Park Row, New York

Caveats are desirable if an inventor is not fully prepared to apply for a patent. A Caveat affords protection for one year against the issue of a patent to another for the same invention. Patent Office fee on filing a Caveat, $10. Agency charge for preparing and filing the documents from $10 to $12 Address MUNN & CO., 37 Park Row, New York.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4·00 a year. Advertisements 17c. a line.

Japanese Paper Ware—Spitoons, wash basins, pails, milk pans, etc. Perfectly water-proof, and will not break or rust. Send for circulars. Jennings Brothers, 352 Pearl st., New York.

Catlin's Patent Self-closing Barrel Filler for filling packages with liquids of any kind. See other advertisement, and address, for circular, S. C. Catlin, Cleveland, Ohio.

Rawhide Sash Cord has no equal for heavy windows or dumb-waiters. Makes the very best round belting. Darrow M'f'g Co., Bristol, Ct.

Scroll Saw.—Pirst Prize Fair American Institute, N. Y., and Richmond, Va., State Fair. For price, etc., address T.L.Cornell, Derby, Conn.

Wanted.—Information of S. O. Scott, mechanic, formerly of N. Y. city. Something to his advantage. Address R. H. Wanener, Attorney, 26 N. 7th st., Philadelphia, Pa.

Wanted.—A 2d-hand engine and boiler, about 3-H. P. Address, stating price. W. L. Swift, Hart's Village, N. Y.

Balloon.—Any one able to make a regular balloon will address Box 444, Charleston Postoffice, S. C.

Wanted—A Partner with a Capital of $5,000 in a Water-power Manufacturing Business, established. Address Andrews & Son, Rock Falls, Ill.

Pictures for the World.—Prang's latest publications: "Wild Flowers," "Water Lilies," "Chas. Dickens," for sale everywhere.

Business Chance.—A good, energetic mechanic, either molder or machinist, with a modcrate capital, can get a good chance in an established Foundery and Machine Business. Address lock box No. 14, Hastings, Minnesota.

Dickinson's Patent Shaped Carbon Points and adjustable holder for dressing emery wheels, grindstones, etc. See Scientific American, July 24th, and Nov. 20, 1869. 61 Nassau st., New York.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

For the best Oil Cups, for shafting and machinery, address H. Moore, 41 Center st., New York.

"Your $50 Lathes are worth $75." Good news for all. At your door. Catalogues Free. N. H. Baldwin, Laconia, N. H.

Wanted.—Situation as Superintendent or foreman in Machine Works. Fifteen years' experience. Address P.O. Box 1016, Worcester, Mass.

Foundery and Machine Shop for sale, with fine lot of patterns. Is doing a good business; excellent location for general jobbing, and for m'f'g agricultural implements. Address S. Moore & Bro., St. Peter, Minn.

Patent Water-proof Building Paper for Carpet for halls and stairways, shoe stiffening, walls, ceilings, and roofs, manufactured by Mc Neil, Irving & Rich. Patentees, Elwood, Atlantic Co., N.J., or 59 Duane st., New York, 520 Commerce st., Philadelphia, Pa.

The best hand shears and punches for metal work, as well as the latest improved lathes, and other machinists' tools, from entirely new patterns, are manufactured by L. W. Pond, Worcester, Mass. Office, 98 Liberty st., New York.

Scientific American.—Back Nos., Vols., and Sets for sale. Address Theo. Tusch, City Agent, Sci. Am., 37 Park Row, New York.

Wm. Roberts & Co., Designers and Engravers on Wood, 36 Beekman st., New York, would respectfully announce that they are now prepared to receive orders from Manufacturers, and others, for engraving of machinery, views of stores, factories, trade marks, etc., etc.

$15 for the best Saw Gummer out. Address The Tanite Co., Stroudsburg, Pa.

The entire Right of the best Wrench ever Patented, for sale. For Drawings, address J. F. Ronan, 36 Orchard st., Boston, Mass.

Machinists and others using Fine Tools, send for illustrated catalogue. Goodnow & Wightman, 23 Cornhill, Boston.

Tempered Steel Spiral Springs for machinists and manufacturers. John Chatillon, 91 and 93 Cliff st., New York.

One 60-Horse Locomotive Boiler, used 5 mos., $1,200. Machinery rom two 500-tun propellers, and two Martin boilers very low. Wm. D. Andrews & Bro., 414 Water st., New York.

Kidder's Pastilles.—A sure relief for Asthma. Price 40 cents by mail. Stowell & Co., Charlestown, Mass.

Pat. paper for buildings, inside & out, C. J. Fay, Camden, N. J.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Keuffel & Esser, 71 Nassau st., N.Y., the best place to get 1st-class Drawing Materials, Swiss Instruments, and Rubber Triangles and Curves.

For tinmans' tools, presses, etc., apply to Mays & Bliss, Plymouth, st., near Adams st., Brooklyn, N. Y

Glynn's Anti-Incrustator for Steam Boiler—The only reliable preventative. No foaming, and does not attack metals of boiler. Liberal terms to Agents. C. D. Fredricks, 587 Broadway, New York.

To ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's manufacturing news of the United States. Terms $4·00 a year.

Cold Rolled—Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlins, Pittsburgh, Pa.

For mining, wrecking, pumping, drainage, and irrigating machinery, see advertisement of Andrews' Patents in another column.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however when paid for as advertisements at $1·00 a line, under the head of "Business and Personal.

All reference to back numbers should be by volume and page.

M. E., of Pa.—Railway cars, built wholly of iron, were first made by Mr. Brunel, in 1842, and were used on the Great Western Railway, England.

C. H. C., of Pa.—Consult some practical locomotive engineer in respect to your boiler and engine.

D. B. C., of Vt.—It is certain that piston pressure engines, driven by water, were used as early as 1739. See cut of Belidor's pressure engine, page 355, Ewbank's "Hydraulics and Mechanics."

R. C. P., of N. Y.—To kill *aphidæ*, or plant lice, which this season appear to greatly infest almost all plants of a succulent character, the surest way is to place over the plant a barrel or a dry-goods box previously made tight by caulking the cracks, and place under the box a small wire basket, or something similar, in which tobacco will burn freely. Ignite the tobacco, and as soon as it gets well to burning, shut down the box, pressing the edges into the earth; the air in the box will sustain the combustion for a little time, and become replaced with tobacco smoke. After four or five hours the box may be lifted, when the offending insects will all be found dead. By tapping the plant, so as to jar it slightly, the result will be apparent on the ground below. We have tried many plans, but find none so effective as this. Some plants, however, are so large that they cannot be treated in this way, unless they chance to be in the greenhouse. In this case the whole house may be filled with smoke, and no boxes are required. Honeysuckles are very apt to be infested by these insects, which accumulate upon the bunches of buds With these and other plants of a similar kind, we have tried with success the plan of dipping the bunches in a very strong decoction of tobacco This, while it does not directly kill the plant lice, unless the application is protracted beyond practicable limits, weakens them so that if done previous to a smart shower, or if followed by a copious and violent syringing, they will drop off, and may be beaten into the earth, where they perish.

G. P. R., of Ky.—We believe there is no fixed unit of the conductivity of metals. Despretz called the conducting power of gold 1000, and found by his experiments that the comparative conductivities of the other principal metals were as follows: Platinum, 981; silver, 973; copper, 897; iron, 374; zinc, 363; tin, 304; lead, 179. Other experimenters have attained different results. Wiedemann and Franz took silver as a standard of comparison, calling its conductivity 100. They found the comparative conductivity of copper to be 73·6; gold, 55·2; tin, 14·5; iron, 11·9; steel, 11·6; lead, 8·5: platinum, 8·4. Others have obtained still different results, which shows that the exact ratios of the conductivities of metals have not been satisfactorily determined.

M. M., of Conn.—Richard Trevithick was the inventor of the locomotive. The British Patent Office has the drawings of the first locomotive in its possession. Trevithick was the first to couple the driving wheels; he also applied the steam jet to the chimney, and ascertained that smooth wheels would adhere sufficiently on rails to give the required traction, without the use of teeth. The idea of planting evergreen trees, such as pine, cedar, hemlock, along the cuttings of railways is good and effective to prevent snow drifts on the track, but not new. We believe it is practiced in this country. In France the plan has long been successfully employed.

E. E., of Ky.—Hollow iron piles have been sunk by introducing through them a current of water, which lifts the sand under the point of the pile, and the latter then settles. This method of sinking piles has been very successfully practiced in England. The iron columns are generally 9 inches in diameter; and they are sunk at the rate of between one and two feet per minute. In one case the iron pile was sunk 26 feet in 20 minutes. A force pump is employed to drive the water down through the column against the sand, which is lifted and carried along the sides of the column.

E. C. O., of Ohio.—To construct a mercury pressure gage, to indicate a very high pressure, make a tube bent backward and forward like a nest of steam pipes used for heating; the bent pipe to be placed so that the bends shall be alternately at the top and bottom. Make holes in the top bends, through which mercury may be put, and fill each bend half full with mercury. Fill the remainder with some light fluid, as alcohol, glycerin, oil, etc., and then seal the apertures. The pressure you can measure with such a gage will depend upon the length and number of the bends.

J. D., of N. Y.—We should not think of making a round chimney with an internal diameter of less than four feet, for the furnaces of boilers designed to furnish two hundred horse-power, if the hight of the chimney were limited to eighty feet, as you state. This diameter would give more draft than needful in many cases when the length of flue circuit is comparatively small, but it is best in building a chimney to provide for ample draft, even if when completed it is found there is a margin of surplus.

L. D. T., of N. J.—You labor under a mistake arising from your failure to understand that all measurement of the angles of heavenly bodies made from the earth's surface, only show *apparent* position. The true position can only be determined by making corrections for refraction, parallax, and aberration. Of course we cannot enter upon the discussion of these things here, but it seems strange that you should attempt to reason upon a subject without first endeavoring to master its first principles.

H. F. C., of Pa.—You may soften the water drawn from your well by the addition of a little milk of lime, or a little caustic soda. The amount necessary must be determined by experiment. See articles on pages 98 and 217, Vol. XXI., SCIENTIFIC AMERICAN.

D. C., of Ill.—We are informed that the cement used in the manufacture of scythe rifles to hold the emery, is simply common glue. or glue with a small quantity of gum tragacanth added. The latter is thought not to be essential.

J. G. F., of Wyomimg Territory.—Your solution of the mechanical problem on page 192, last volume of the SCIENTIFIC AMERICAN, employs a toothed wheel, which is expressly forbidden in the enunciation.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

CULTIVATOR.—J. W. Philp, Humboldt, Tenn.—This invention has for its object to furnish an improved cultivator, which shall be simple in construction, strong, durable, not liable to break or get out of order, and which may be easily adjusted for use in cultivating wide or narrow rows.

HORSE DETACHING APPARATUS.—John C. Hancock, Charlestown, and Edward P. Richardson, Somerville, Mass.—This invention has for its object to furnish an improved apparatus for detaching the horse or horses from the vehicle instantly, when from fright or other cause he or they may have become unmanageable, and which shall at the same time be simple in construction and easily operated.

COMBINED HINGE AND RING FOR LOCKETS.—George Hartje, New York city.—This invention has for its object to furnish an improved combined hinge and ring for lockets, which shall be simple in construction, neat in appearance, strong, and durable, and which will allow raised work to be attached to the locket without interfering with the proper operation of the hinge.

PEN HOLDING ATTACHMENT FOR INKSTAND.—Matthew O'Reardon, New York city.—This invention has for its object to furnish an improved pen and pencil holding attachment for inkstands, which shall be simple in construction, convenient in use, and easily attached to the inkstand.

BRIDGE.—Thomas B. Gregory, Champaign, Ill.—The object of this invention is to so construct a bridge that the same may be adjusted vertically to correspond with all similar adjustments of the roads to which such bridge may pertain. The invention consists in the construction of extension posts, of which the upper parts are secured to the cap, and the lower to the supporting frame or sill of the bridge.

AWL.—Samuel Babbitt, Brazil, Ind.—This invention relates to a new awl, which is so constructed that it may be used to draw a double or single thread outwards from the inside of a boot or shoe, and also to carry it inward from the outside, as may be desired.

SHOW CARD SUSPENDER AND CLASP.—William Stokes, New York city.—The object of this invention is to form a card suspender by stamping it out of sheet metal, so that when bent in its proper shape for use, a spring loop will be formed, which will serve to keep the card suspender locked, and also form a loop whereby the same may be suspended.

FEVER MEDICINE.—Samuel Laighton, Newark, N. J.—This invention relates to a new compound for curing fever and ague in all its various forms, especially that produced by miasmatic exhalations.

GRAIN CLEANER AND SEPARATOR.—Wm. Gardner, Catalpa, Ky.—This invention relates to a new grain separator, which is to be attached to thrashing machines, or used in barns for separating wheat and other grains from the chaff. The invention consists chiefly in the combination of a peculiar screen belt with a series of perforated plates.

WATER REGULATOR AND ALARM FOR STEAM BOILERS.—William Wyatt, Nashville, Tenn.—The object of this invention is to construct an attachment to steam boilers whereby the operation of the feed pumps will be so regulated as to keep the water in the boiler at the required hight; also, to connect with a regulator of this nature an alarm which will only be worked when the water is below the safety level.

WEATHER STRIPS.—W. Miller, Chicopee, Mass.—This invention relates to improvements in weather strips, such as patented to him the 4thday of May, 1869, No. 89,785, and consists in an improved construction and manner of attaching the spring, by which the lower vibrating strip is confined to the upper strip or bracket, which is attached to the door.

SCRUBBING BRUSH.—Jacob Odell, Petroleum Center, Pa.—This invention relates to improvements in scrubbing brushes, and consists in the application to the block, to which the bristles are attached, near each end, leaving an open space between, of a stiff india-rubber scraper to scrape the hard substances adhereing to the floor, which the bristles will not remove.

SPAWNING SCREEN.—A. S. Collins, Caledonia, N.Y.—This invention relates to a new and useful improvement in screens or beds for receiving and securing the spawn of fish, in the art of pisciculture, whereby the process is greatly simplified and the labor diminished; and it consists in the use of a revolving screen, arranged and operating as described.

CLASP FOR PAINT BRUSHES, ETC.—George W. Hupp, Elwood, Ind.—The object of this invention is to provide paint and other brushes with an adustable and detachable clasp for holding the bristles together. This improved clasp is made of metal, and secured to the handle of the brush in such manner that it can be adjusted up and down on the handle, to make up for the gradual shortening of bristles.

FOLDING BUGGY SEAT.—Thomas H. Wood, New York city.—This invention relates to a new fly seat, applied behind an ordinary buggy seat, or to any suitable kind of wheeled vehicle, with an object of being brought out of the way and entirely out of sight when not used. The invention consists chiefly in hinging or affixing the seat to the hinged back plate of the vehicle so that it will be carried back with the same, when to be used, and concealed in the body of the vehicle when not used.

SOLDER KIT.—Michael D. Kelly, Cadiz, Ky.—This invention relates to a new and improved solder-holding apparatus, and consists in a glass bottle for holding the acids and other substances used by watchmakers for fluxes, and one or more boxes, for holding the solder. so combined in one apparatus that the broad box for the solder serves for a stand and support for the bottle, to prevent it from being upset, as is now frequently the case.

DRIVING WHEELS FOR CARPET SWEEPERS.—Alfred J. Knight, Brooklyn, N. Y.—This invention relates to improvements in the driving wheels for imparting rotary motion to the brushes of carpet sweepers, and consists in the construction of side wheels, with india-rubber roiling surfaces, for rolling on the floor, and metallic gears for working the wheels or the brush, the object being to provide wheels which are noiseless, and have sufficient traction, and which will be durable in the working parts.

MILLSTONE DRESS.—Wm. G. Dunniway and Harrison Osborne, New Cumberland, Ind.—This invention relates to improvements in "dress for burr millstones, and consists in making the leading furrow from the eye to the intersection of the short furrow, about double the width that it, or the short furrow is from the intersection outward, where they are of about the ordinary width, whereby the furrow capacity is made uniform from the eye to the skirt, very greatly increasing the ventilation, and increasing the grinding capacity.

KINDLING FAGOT.—Clement R. Jacobi, Brooklyn, E. D., N. Y.—This invention relates to new and useful improvements in fagots for kindling fires, and consists of a small, cheap, and efficient fagot, made of the waste shavings of cork, refuse discarded by the cork manufacturers, and, until now, wholly worthless for all known useful purposes. The said bundle or fagot being formed by rolling the shavings into compact shape, fastening in any way, and dipping in a bath of varnish, or any liquid substance which will adhere and facilitate the ignition.

MULEY SAW HEAD.—Daniel Cilley, Osceola Mills, Pa.—This invention consists in the manner of holding the head pin box, and in the manner of securing, adjusting, and varying the saw.

COMBINED SEED PLANTER, CULTIVATOR, AND HARROW.—Jones K. McClure, Cornersville, Miss.—This invention has for its object to furnish an improved machine, which shall be so constructed and arranged that it may be easily adjustable for use as a cotton seed planter, corn planter, cotton scraper, cotton chopper, harrow, and cultivator, doing its work well and thoroughly in either capacity.

INJECTOR FOR STEAM BOILER.—Jean Pierre Florimond Datichy, Brooklyn, N. Y.—This invention has for its object to provide a self-acting feed apparatus, operating automatically, with more or less rapidity, and supplying water that is heated to a very fine degree of temperature. The invention consists principally in causing steam from the boiler to regulate the feed, in strict accordance with the pressure of the steam in the boiler.

HOD ELEVATOR.—Jesse Powers, Chicago, Ill.—This invention relates to a new apparatus for elevating and lowering hods, during the construction of new buildings.

FRUIT STRAINING APPARATUS.—M. E. Grigsby, Putnamville, Ind.—This invention relates to a new and useful improvement in an apparatus for straining fruit in the process of manufacturing jelly, wines, cordials, etc.

WATER WHEEL.—Joseph Bastion, Canton, N. Y.—This invention relates to a new and useful improvement in water wheels, whereby they are made more powerful and useful than they have hitherto been, and consists in the manner of arranging the buckets in the wheel, and in a self-adjusting shute cone, and arrangement of the shutes.

MACHINE FOR DRESSING STONE.—A. G. Anderson, Quincy, Ill.—This invention has for its object to furnish an improved machine for dressing marble and other stone, which shall be simple in construction and effective in operation, doing its work uniformly and well.

SAFETY CAPS FOR CANS.—Horace C. Alexander, New York city.—This invention has for its object to improve the construction of safety caps for cans, so as to make them neater in appearance and simpler in construction while being equally effective in use.

STEAM GENERATOR.—Robert Patterson, Catskill, N. Y.—This invention relates to a new and improved method of generating steam, and consists in an apparatus whereby heat is transmitted to the water by means of steam, and not by bringing the water in contact with fire surface metallic plates, and in the use of an absorbantgenerating and condensing medium.

LINK FOR ENDLESS CHAIN HORSE POWER.—G. L. Sheldon, Hartsville, Mass.—This invention relates to a new and useful improvement in links used in forming the revolving chain apron of the well-known endless chain or railroad horse power.

FIRE ESCAPE.—L. Wahle, Davenport, Iowa.—This invention relates to a new fire escape, of that class in which lazy tongs for elevating and lowering a flexible ladder, are employed. The invention consists in the novel construction of screw power for operating the said pivoted frame; also in the application of a device for adjusting the jointed frame and ladder in any desired inclination, and finally in the apparatus for stretching the hain ladder.

AUTOMATIC FEEDER AND INDICATOR FOR STEAM BOILERS.—Alfred D. Clark, Greenfield, Ohio.—This invention has for its object to automatically alternately introduce and cut off a supply of water to a steam boiler according to the needs of the case, and also to indicate by a whistle or bell every such introduction and shutting off.

COFFIN.—Isaac C. Shuler, Amsterdam, N. Y.—This invention consists in providing wooden coffins with metal beading, for the purpose of causing them to simulate the more expensive class of coffins having inserted or raised panels.

PUMP.—H. M. Wyeth, Newark, Ohio.—This invention consists in the combination with an ordinary double-acting atmospheric pump, provided with a cap tightly packed, through which the pump-rods work in stuffing boxes, of a pipe passing vertically through the cap and thus communicating with the interior of the pump, by which arrangement, when the spout through which the water raised by the atmospheric pump flows is closed, the apparatus is converted into a force pump, so that it can be made a double-acting atmospheric pump and a double-acting force pump combined in a single cylinder and working with a single lever.

APPLICATION FOR BOTTLING LIQUIDS.—Charles A. Gregory, Poughkeepsie, N. Y.—This invention has for its object the construction of a machine or apparatus for filling bottles, and by the use of which the labor of the ordinary way may be very much reduced, and loss by spilling or overflowing of the bottles be obviated.

BOILER TUBE CLEANER.—John Green, Boston, Mass.—This invention relates to a new implement for cleaning boiler tubes, and consists in the combination of two or more curved and elastic grapple scrapers with a spiral augur.

TANNING.—John Campion, Woburn Centre, Mass.—This invention relates to improvements in tanning skins of animals, and consists in forcing the tanning liquor through the skins in liming, dressing, and tanning them, by hydrostatic pressure applied to one side of the skin, so as to force the liquor through from one side to the other.

STEREOSCOPES.—Edwin K. Page, Havana, N.Y.—This invention relates to improvements in stereoscopes, and consists in the application to the lens frame of a lazy tongs extension frame for holding pictures, the said frame being connected to the lens frame in a peculiar way, and formed at the outer end with a picture holder, and also arranged to fold up against the side of the lens. The invention also comprises an arrangement of the eye shades for folding down upon the lens on the one side and the central dividing screen to fold down on the other side, and the whole forming a protecting case for the lens.

WATER CLOSET APPARATUS.—John Keane, New York city.—This invention relates to improvements in apparatus for governing the flow of water to and from the basins of water closets.

ROD COUPLING.—J. Hanna, Petroleum Centre, Pa.—This invention relates to improvements in rod couplings, and consists in an improved means for connecting the socketed metallic joints for wood rods to the same.

SHOE STRING FASTENING.—Chas. M. O'Hara, Bolivar, Tenn.—This invention relates to improvements in shoe string fastenings, to be used in substitution of tying the knots in the strings after the shoes are laced up. It consists of two plates of metal connected to one stud, one being shaped in a peculiar way, and adapted to receive the strings and spring down upon them when wound around the stud between it and the other, so as to hold them securely. The same plate is provided with a tongue or spur for passing through an eyelet or other hole in one of the flaps of the shoe for attaching thereto.

WELL AUGER.—John Wilson and G. H. Balsley, Hamilton, Mo.—This invention relates to improvements in augers for boring wells in the earth, and consists in an improved arrangement of the bits for th better working in coarse gravel, and adapted equally as well as others for work in other substances. It also consists in the application to the auger rod, a short distance above the auger, of a bucket, and above this a radial cutter or reamer, for enlarging the bore and delivering the cuttings into the bucket to be raised out thereby.

ANODYNE COUGH SIRUP.—Lucy J. Buttrill, Jackson, Ga.—This invention has for its object to furnish a simple, reliable, and efficacious medicine for the cure of coughs, cold, bronchitis, affections of the throat, croup, asthma, consumption, chronic affections of the lungs, and all pulmonary diseases.

Official List of Patents.

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FOR THE WEEK ENDING July 12, 1870.

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105,157.—SAFETY CAP FOR CANS.—H. C. Alexander, New York city.
105,158.—FAN CASE FOR GRAIN AND SEED SEPARATORS.—C. L. Allen (assignor to himself and Wm. Shick), Flat Rock, Mich.
105,159.—MACHINE FOR DRESSING STONE.—A. G. Anderson, Quincy, Ill., assignor to himself and A. W. Anderson.
105,160.—MANUFACTURE OF TOBACCO PAPER.—R. Antiguedad, New York city.
105,161.—AWL.—Samuel Babbitt (assignor to himself and J. L. Hussey), Brazil, Ind.
105,162.—DOUBLE-ACTING FORCE PUMP.—Allen Bagley, Ypsilanti, Mich.
105,163.—WATER WHEEL.—Joseph Bastion, Canton, N. Y.
105,164.—BIRD CAGE.—Thomas H. Bradley, St. Louis, Mo.
105,165.—HORSE HAY RAKE.—Alzirus Brown, Worcester, Mass.
105,166.—LATHE FOR TURNING WOOD.—J. C. Brown, Washington, D. C.
105,167.—DAMPER.—Micajah C. Burleigh, Somersworth, N. H.
105,168.—MEDICAL COMPOUND.—Lucy J. Buttrill, Jackson, Ga.
105,169.—APPARATUS FOR TANNING.—John Campion, Woburn Center, Mass.
105,170.—SUSPENSION GATE.—Edward Chadderdon, Howard, Mich., assignor for one half to Albert Stineback.
105,171.—LANTERN.—David Challinor, Birmingham, Pa.
105,172.—COTTON-BALE TIE.—Wm. Chambers, New Orleans, La.
105,173.—PRUNING SHEARS.—Athanasius B. Chapman, Clyde, Ohio.
105,174.—MULEY-SAW HANGINGS.—Daniel Cilley, Osceola Mills, Pa.
105,175.—COFFEE POLISHER.—Edward J. Codd, Baltimore, Md.
105,176.—SPAWNING SCREEN.—Alfred S. Collins, Caledonia, N. Y.
105,177.—SAFETY HOISTING APPARATUS.—C. W. Copeland, New York city.
105,178.—THILL COUPLING.—P. S. Crawford, Union, assignor to J. N. Widden, Rockford, Ill. Antedated June 30, 1870.
105,179.—CYLINDER STOVE.—John Currier and Abiel Pevey, Lowell, Mass.
105,180.—PROCESS AND APPARATUS FOR HARDENING FILES, etc.—Samuel Darling (assignor to Darling, Brown & Sharpe), Providence R. I.
105,181.—INJECTOR FOR STEAM BOILERS.—J. P. F. Datichy, Brooklyn, N. Y.
105,182.—APPARATUS FOR SPONGING CLOTH.—I. A. Davis, Philadelphia, Pa.
105,183.—ICE-CUTTING MACHINE.—Abraham Deutschel, Cleveland, Ohio.
105,184.—MOWER AND REAPER SICKLE SHARPENER.—Elihu Doud, Oshkosh Wis.
105,185.—SNOW PLOW.—J. N. Drake, Liberty, Mich.
105,186.—MILLSTONE DRESS.—W. G. Dunniway and Harrison Osburn, New Cumberland, Ind.
105,187.—KNITTING MACHINE.—W. Franz, Bucyrus, and Wm Pope, Crestline, Ohio.
105,188.—BORING MACHINE.—J. W. Frazee, Peoria, Ill.
105,189.—MACHINE FOR MAKING HORSESHOE NAILS.—P. N. Gallaer and I. C. Tate, New London, Conn.
105,190.—GAS MACHINE.—Joseph P. Gallagher, St. Louis, Mo.
105,191.—PESSARY.—W. R. Gardner, Leonardsville, N. Y.
105,192.—SADIRON HANDLE.—Joel Gleason, Whitestone, N. Y.
105,193.—WASHING MACHINE.—Isaiah W. Graffam, New Bedford, Mass.
105,194.—BOILER-TUBE CLEANER.—John Green, Boston, Mass.
105,195.—BRIDGE.—T. B. Gregory, Champaign, Ill.
105,196.—FRUIT-STRAINING APPARATUS.—Mary E. Grigsby, Putnamville, Ind.
105,197.—COMBINED LATCH AND LOCK.—Theodor Hahn, New York city. Antedated June 30, 1870.
105,198.—HORSE-DETACHING APPARATUS.—J. C. Hancock, Charlestown, and E. P. Richardson, Somerville, Mass.
105,199.—ROD COUPLING.—Francis J. Hanna, Petroleum Center, Pa.
105,200.—SEEDING MACHINE.—John D. Harrison, Middletown, Ohio.
105,201.—COMBINED HINGE AND RING FOR LOCKETS.—Geo. Hartje, New York city.
105,202.—CLIP FOR HARNESS.—J. S. Hays (assignor to himself and Philip Miller), Williamsport, Pa.
105,203.—FIRE EXTINGUISHER.—Ludwig Herman, Detroit, Mich.
105,204.—OSCILLATING ENGINE.—Thos. Hill, Vallejo, Cal.
105,205.—GUARD FOR AX HANDLES.—Lara B. Hoit, Cedar Falls, Iowa.
105,206.—SASH HOLDER.—Josiah Hoisinger (assignor to Benjamin Honsinger), Harrisburg, Pa.
105,207.—FEED-WATER HEATER FOR LOCOMOTIVES.—J. S. Hooton, New Carlisle, Ind.
105,208.—CRAB FOR HAND-HOLE PLATES.—J. S. Hooton, New Carlisle, Ind.
105,209.—FEED-WATER FILTER.—J. S. Hooton, New Carlisle, Ind.
105,210.—CLAPBOARD GAGE.—E. Horton, Dundee, N. Y.
105,211.—COTTON HARVESTER.—D. C. Hubbard, Point Coupee Parish, La.
105,212.—CLASP FOR PAINT BRUSH.—Geo. W. Hupp, Elwood, Ind.
105,213.—KINDLING FAGOT.—Clement R. Jacobi, Green Point, N. Y.
105,214.—STATION INDICATOR.—Egbert Jamieson, Chicago Ill.
105,215.—VENTILATOR.—H. S. Janes, Oshkosh, Wis.
105,216.—TEMPLETS FOR PANELING MACHINE.—N. Jenkins, New York city. Antedated June 29, 1870.
105,217.—WATERCLOSET VALVULAR APPARATUS.—J. Keane, New York, assignor to himself and George H. Brown, Milbrook, N. Y.
105,218.—KALEIDOSCOPE.—Matthias Keller, Boston, Mass., assignor to himself, S. B. Holden, and L. L. Holden.
105,219.—SOLDERING KIT.—M. D. Kelley, Cadiz, Ky.
105,220.—AUTOMATIC SLUICE GATE.—Jacob Keplinger, Farmersville, Ohio.
105,221.—FARM FENCE.—Peter Kidney, Olmsted Falls, Ohio.
105,222.—FOLDING SEAT.—G. W. King, Oswego, N. Y., assignor for one third of his right to A. P. Grant.
105,223.—DRIVING-GEAR WHEEL FOR CARPET SWEEPERS.—A. J. Knight, Brooklyn, N. Y.
105,224.—FEVER-AND-AGUE MEDICINE.—Samuel Laighton, Newark, N. J.
105,225.—CULTIVATOR.—Jonathan Lewis, Washington, D. C.
105,226.—LEMON FRUIT SIRUP.—Schuyler W. Mahan, Adrian, Mich.
105,227.—RASPBERRY AND STRAWBERRY FRUIT SIRUP.—S. W. Mahan, Adrian, Mich.
105,228.—CARRIAGE AND CAR WHEEL AND AXLE BOX.—J. A. Maynard, Newtonville, Mass.
105,229.—COMBINED SEEDER, PLANTER, CULTIVATOR, AND HARROW.—J. K. McClure, Cornersville, Miss.
105,230.—FLOOD FENCE.—D. J. Miller, Indianapolis, assignor of one half interest to Fielding Beeler, Marion county, Ind.
105,231.—COMBINED FENDER AND FIRE SCREEN.—J. Miller and W. H. B. Flender, Washington, Pa.
105,232.—WEATHER STRIP.—Wm. Miller, Chicopee, Mass.
105,233.—FRAME FOR SENSITIZING PHOTOGRAPHIC PAPER.—L. V. Moulton, Muskegon, Mich.
105,234.—FIREPLACE GRATE.—Emma Norman, New Orleans, La.
105,235.—SUCKER-ROD COUPLING.—Jacob Odell, Petroleum Centre, Pa.
105,236.—SHOESTRING FASTENING.—C. M. O'Hara, Bolivar, Tenn.
105,237.—PEN RACK.—Mathew Reardon, New York city.
105,238.—APPARATUS FOR STAKING HORSE-POWERS.—B. F Osgood, Coloma, Mich.
105,239.—FARM FENCE.—T. W. Owens, Granville, Ohio.
105,240.—MACHINE FOR TIGHTENING ROPES, ETC.—Arthur Paget, Loughborough, England. Patented in England, April 21, 1868.
105,241.—BRICK KILN.—C. A. Parker, New Orleans, La.
105,242.—HARNESS MAKERS' EDGING TOOL.—F. M. Patterson and H. P. Miller, Seymour, Ind.
105,243.—STEAM GENERATOR.—Robert Patterson, Catskill, N. Y.
105,244.—MACHINE FOR SHARPENING THE TEETH OF SAWS.—H. J. Perkins (assignor to G. S. Snyder), Williamsport, Pa. Antedated July 1, 1870.
105,245.—SAD IRON HEATER.—Ezekiel Phillips, Blackstone, Mass.
105,246.—HOD ELEVATOR.—Jesse Powers, Chicago, Ill.
105,247.—MANUFACTURE OF LEATHER.—Wm. Pyle, Wilmington, Del.
105,248.—SCAFFOLDING.—Alfred Ray and Benj. F. Monson, Shelbina, Mo.
105,249.—RAKING ATTACHMENT FOR FURNACE.—John Rice, Oswego, N. Y.
105,250.—SPOOL MACHINE.—J. F. C. Rider, South New Market N. H., and E. P. Brownell, Providence, R. I.
105,251.—DUMB HORSE VELOCIPEDE.—S. D. Roberts and M Dingee, Brooklyn, N. Y.
105,252.—BATTERY INSULATOR.—O. W. Robertson, Milwaukee, Wis.
105,253.—FOLDING CHAIR.—Augusta M. Rodgers, Brooklyn, N. Y.
105,254.—REFINING SUGAR.—John Rogers and and L. Reid, Brooklyn, N. Y.
105,255.—PRUNING SHEARS.—John G. Rogers, Dowagiac, Mich.
105,256.—LAMP CHIMNEY CLEANER.—James Ryan, Brooklyn, N. Y.
105,257.—CANDLESTICK.—Henry Rider, New Bedford, Mass.
105,358.—FAUCET.—Julius Schaefer and Gustav Schock, New York city.
105,259.—COUPLING FOR TUMBLING SHAFTS.—S. C. Schofield, Chicago, Ill.
105,260.—RAILROAD CAR STOVE.—J. Q. C. Searle, Topeka, Kansas.
105,261.—SAW.—S. W. Shailer, Deep River, Conn.
105,262.—CHURN.—S. G. Shanks, Richmond, Ky.

105,263.—ENDLESS CHAIN HORSE-POWER LINK.—Gilbert L' Sheldon, Hartsville, Mass.
105,264.—CAR BRAKE.—Theophilus E. Sickels, Kennett's Square, Pa.
105,265.—HUB BORING MACHINE.—Albert R. Silver, Salem, Ohio.
105,266.—CARRIAGE AXLE.—Alfred E. Smith, Bronxville, N. Y.
105,267.—MANUFACTURE OF IRON AND STEEL.—G. H. Smith, New York city.
105,268.—PIPE JOINT.—Hiram Smith, Norwalk, Ohio.
105,269.—PACKING CASE FOR PERFUMERY, ETC.—Thomas P. Spencer, Jersey City, N. J. Antedated June 28, 1870.
105,270.—BRICK-PRESSING MACHINE.—A. J. Sprague, Toledo, Ohio.
105,271.—BORING TOOL.—Thomas E. Stanley, Hazlehurst, Miss.
105,272.—ELECTRO-MAGNETIC APPARATUS FOR REGULATING VALVES AND DAMPERS.—G. M. Sternberg, Fort Riley, Kansas.
105,273.—ELECTRICAL THERMOSTAT.—G. M. Sternberg, Fort Riley, Kansas.
105,274.—SUSPENSION PAPER CLIPS.—Wm. Stokes, New York city.
105,275.—STEAM GENERATOR.—George A. Stone, New York city.
105,276.—HORSE-POWER.—Solomon Stoner, Canton, Ohio.
105,277.—HYDRAULIC SEAL.—James H. Sutton, Honesdale, Pa.
105,278.—CAR COUPLING.—Edward D. Thompson, Lawrence, Kansas.
105,279.—FIRE EXTINGUISHER.—J. B. Van Dyne, Covington, Ky.
105,280.—FIRE ESCAPE.—Lorenz Wahle, Davenport, Iowa.
105,281.—SAWING MACHINE.—L. D. Webber (assignor to himself and S. W. Shailer), Deep River, Conn.
105,282.—BRIDLE BIT.—B. F. Wheeler, Calais, Vt.
105,283.—MANUFACTURE OF FERTILIZERS.—Exum Whitley (assignor to himself and Charles H. Foster), Murfreesborough, N. C.
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REISSUES.

4,065.—SPECTACLES.—Louis Black, Detroit, Mich.—Patent No. 96,387, dated November 2, 1869.
4,066.—CARPET LINING.—G. W. Chipman, Boston, Mass.—Patent No. 60 476, dated December 18, 1866.
4,067.—PROCESS OF EXTRACTING FATTY SUBSTANCES.—Wm. Coffin, Glendale, N. J., assignee of C. F. A. Simonin and E. W. Coffin.—Patent No. 102,166, dated April 19, 1870.
4,068.—SAW.—James Davis, for himself, and Ford W. Davis, assignee of James Davis, Philadelphia, Pa.—Patent No. 72,983, dated January 7, 1868.
4,069.—MANUFACTURE OF STEEL.—William Fields, Wilmington, Del.—Patent 102,796, dated May 10, 1870.
4,070.—MACHINE FOR COMPRESSING CARRIAGE WHEELS.—Henry Killam, New Haven, Conn.—Patent No. 69,818, dated October 15, 1867.
4,071.—WHIP SOCKET.—John O. Merriam and Edwin Chamberlin, Troy, N. Y., assignees of C. B. Morehouse.—Patent No. 52,439, dated February 6, 1866.
4,072.—MANUFACTURE OF GLUE.—T. P. Milligan and Thomas Higgins, Brooklyn, N. Y., assignees of Emerson Goddard.—Patent No. 44,523, dated October 4, 1864.
4,073.—CAR COUPLING.—Manuel Van Slyke and D. W. Wood, Rome, N. Y.—Patent No. 96,514, dated November 2, 1869.

DESIGNS.

4,214.—DOOR BELL.—William Allport, New Britain, Conn.
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EXTENSIONS.

SHOEMAKERS' EDGE PLANES.—Isaac A. Dunham, North Bridgewater, Mass.—Dated June 24, 1856.
SAFETY HATCHES FOR WAREHOUSES.—Wm. H. Thompson, Boston, Mass., and E. P. Morgan, Biddeford Me.—Dated June 24, 1856; additional improvement, dated April 14, 1857.
CONCENTRATING APPARATUS FOR SULPHURIC ACID.—W. T. Clough, Newark N. J.—Dated July 1, 1856.

Inventions Patented in England by Americans.

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PROVISIONAL PROTECTION FOR SIX MONTHS.

1,578.—LOOMS.—James Lyall, New York city. May 30, 1870.
1,584.—ELECTRO-MAGNETIC MOTOR FOR PANORAMAS, ETC.—Louis Finger, Cambridge, Mass. May 31, 1870.
1,585.—INK OR MUCILAGE STAND.—F. T. Grimes, Liberty, Mo. May 31 1870.
1,604.—SPRINGS FOR SEATS, MATTRESSES, ETC.—J. P. Ryan, Augusta, Me. June 2, 1870.
1,598.—SELF-ADJUSTING COUPLERS FOR RAILWAY CARRIAGES.—W. V. Pullman, Kansas City, Mo. June 2, 1870.
1,601.—CARDING AND SPINNING MACHINE.—John Goulding, Worcester, Mass. June 2, 1870.
1,353.—BALL FLOATS.—L. L. Lee, Milwaukee, Wis., and L. L. Weeks, New York city. May 12, 1870.
1,594.—PEAT MACHINE.—C. Laxton, Hudson City, N. J. June 1, 1870.
1,599.—COUPLINGS FOR RAILWAY CARRIAGES.—R. Campion and J. W. Thompson, Jr., Camden, N. J., and J. H. Michener and S. L. Ward, Philadelphia, Pa. June 2, 1870.
1,603.—MODE OF PREVENTING THE CORROSION OF IRON EXPOSED TO WATER OR DAMPNESS.—Cornelius Godfrey, New York city. June 2, 1870.
1,611.—MEANS FOR PREVENTING ALTERATION IN BANKERS' CHECKS.—J. B. Newton, Newport, R. I. June 3, 1870
1,637.—RAILROAD RAILS.—C. T. Forrest, San Francisco, Cal. June 6, 1870.
1,638.—METALLIC PAINT FOR SHIPS' BOTTOMS.—J. G. Tarr and A. H. Wonson, Gloucester, Mass. June 6, 1870.
1,644.—TREATMENT OF SLAG, ETC.—H. Baldwin, Jr., Philadelphia, Pa. June 7, 1870.
1,658.—CARTRIDGE CASES FOR BREECH-LOADING FIREARMS.—N. G. Whitmore, Mansfield, Mass., and A. F. Reed, Jr., Providence, R. I. June 8, 1870.
1,660.—APPARATUS FOR PRODUCING LIGHT FROM HEAVY HYDROCARBONS. R. S. Merrill, Hyde Park, Mass. June 8, 1870.
1,691.—STEAM AND OTHER VESSELS.—Jas. Montgomery, Livingstone, N. Y. June 11, 1870.
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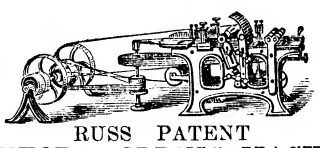

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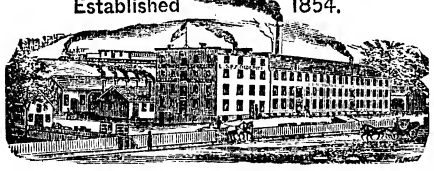

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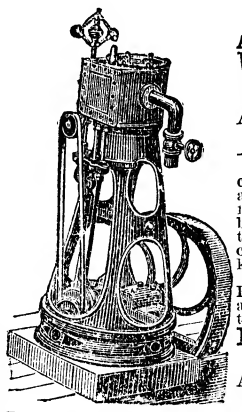

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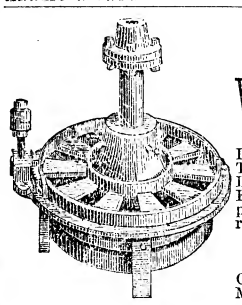

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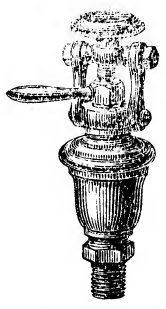

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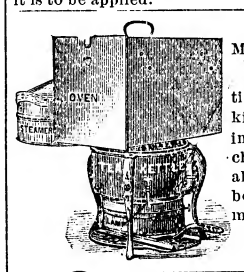

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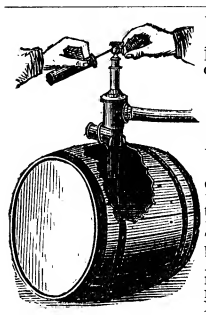

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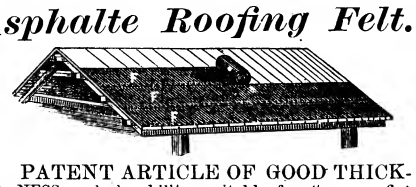

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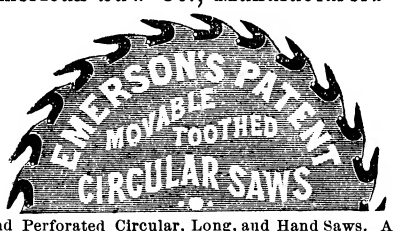

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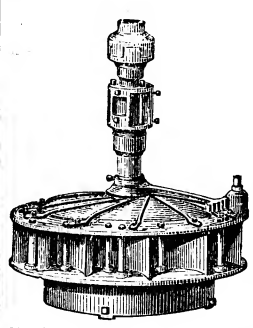

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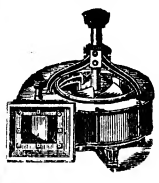

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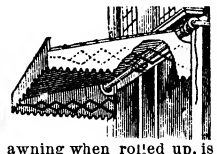

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